On the study of various earthquakes and related equations. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory

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Abstract

In this paper, we analyze various earthquakes and related equations. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory

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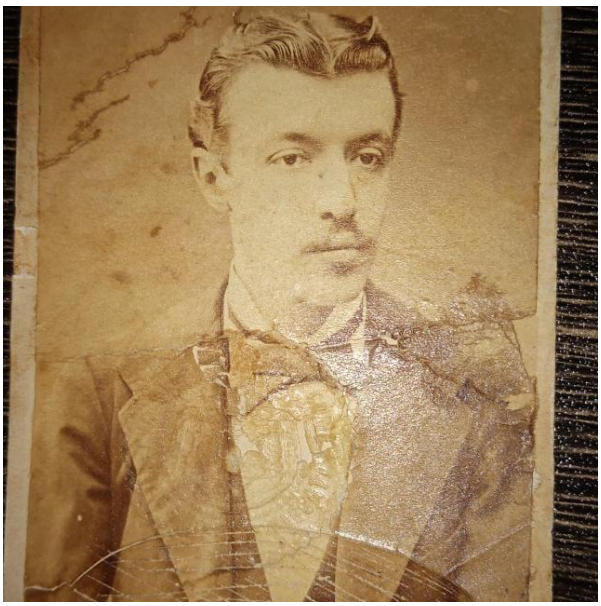
Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

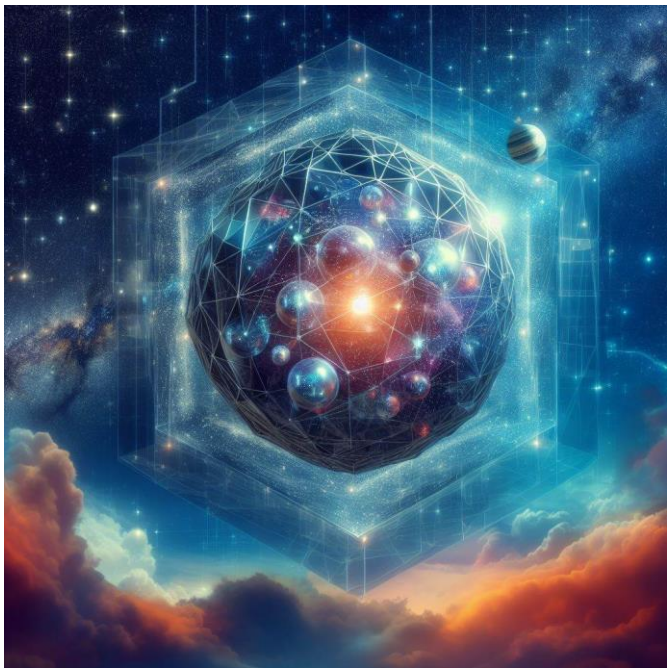
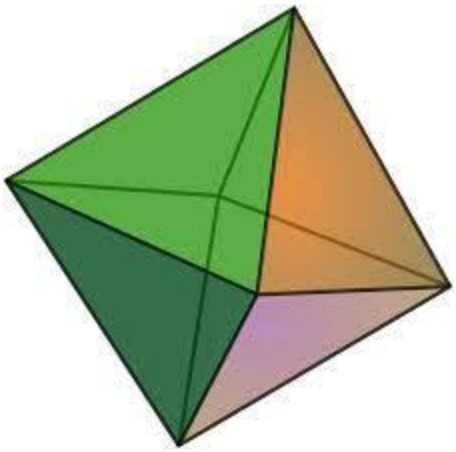
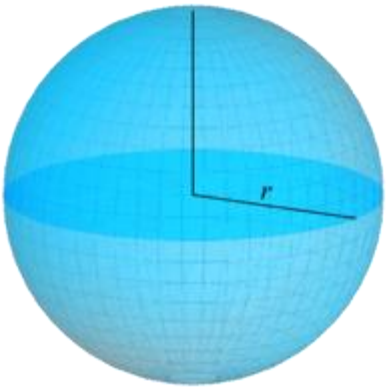


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\,\pi\,x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$$l = 0\,, \quad x = 0$$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi\,x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi\,x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

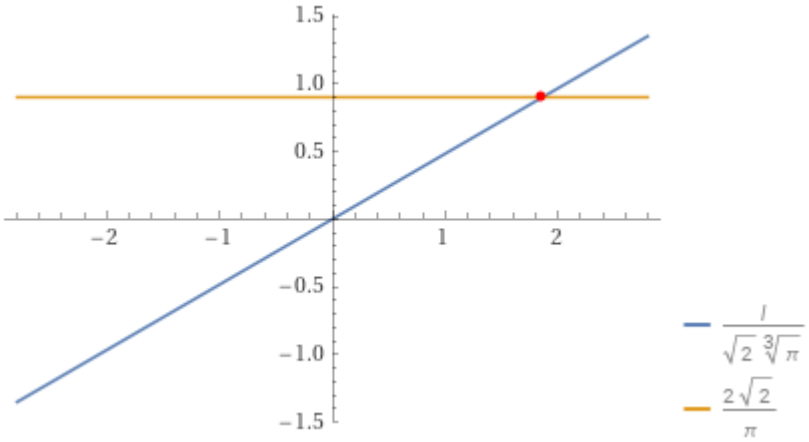
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

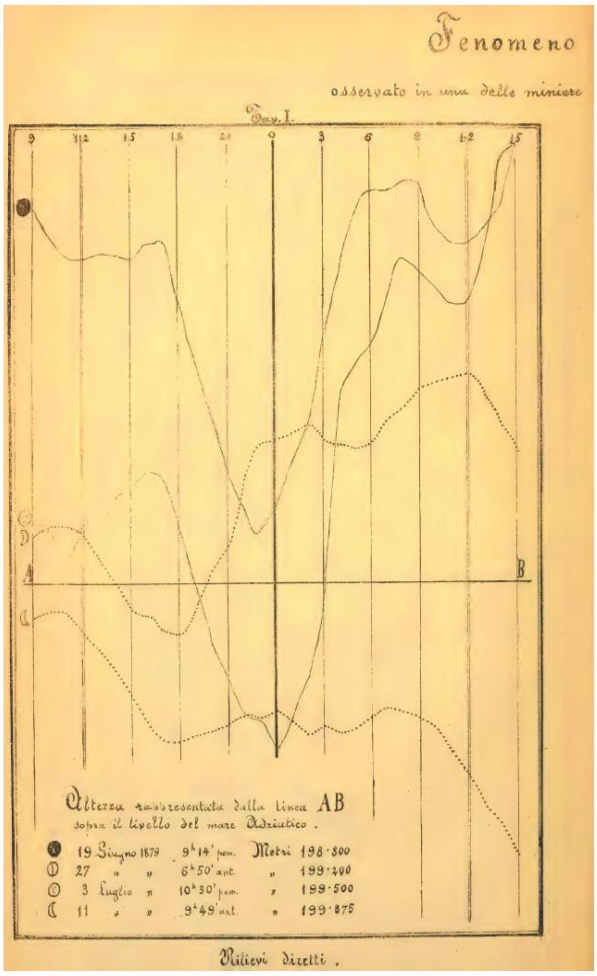
Plot

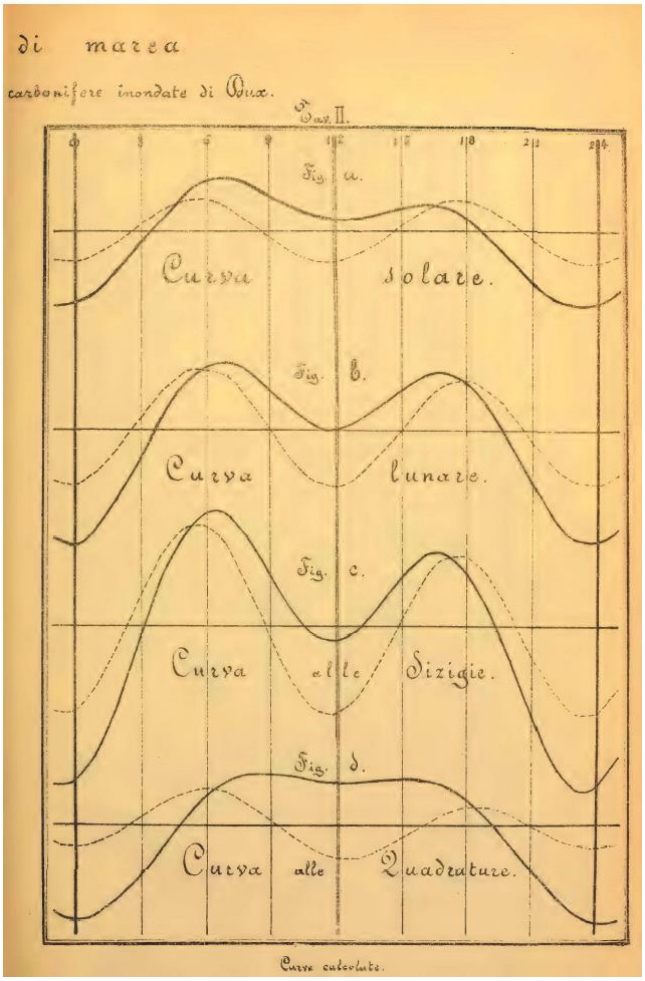


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

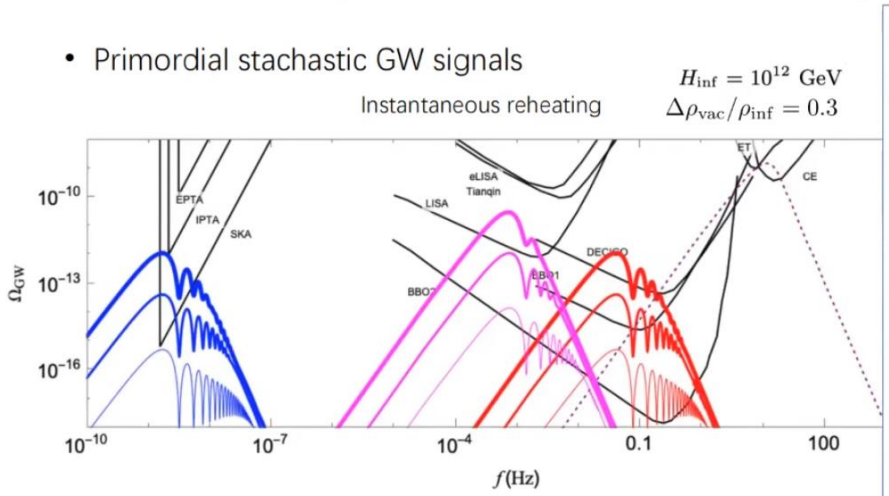

di marea
carbonifere inondate di Pux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

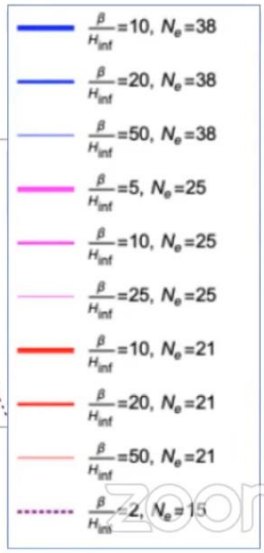
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

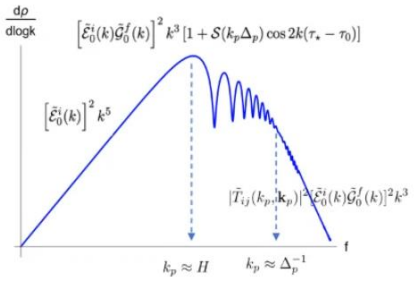
Comparison between primary GW and secondary GW

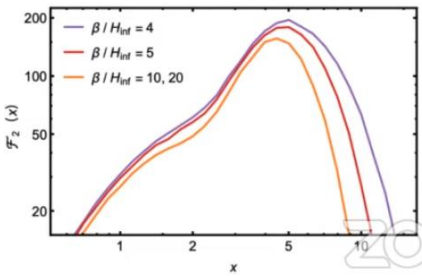
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





From

De Giorgi C., **Ricerche su i terremoti avvenuti in Terra d'Otranto dall'XI al secolo XIX**, in "Memorie della Pontificia Accademia dei Nuovi Lincei", vol.15, pp.95-154. Roma 1898

Anno 1638. — " A Maggio si fecero grandi penitenze e proces-
„ sioni per i continui e forti terremoti che travagliano il Regno
„ di Napoli „.

Cf. Cronaca MS. di Andrea Panettera, leccese, esistente in Lecce nel Museo provinciale Castromediano. Non si accenna se fu avvertito in Terra d'Otranto.

Thursday 13 May 1638 18:38:18 New Moon 22°51'39 375315.41 km

12/06/1638	4.55	Eclisse parziale. Magnitud. = 0,13	Settentrionale	4.33	19.45

Anno 1667. — Il giorno 6 di Aprile verso le ore dieci italiane (ore 4 e 32 minuti in tempo medio locale del 7 Aprile) del mattino, il terremoto scotendo il terreno e le case gettò in Brindisi lo scompiglio e il terrore. " Per gratia di Dio e della gloriosa „ Vergine, dice la Cronaca, non successe danno „. Gravi danni produsse invece sull'opposta sponda dell'Adriatico in Ragusa.

Cf. Ferrando Ascoli. *La storia di Brindisi.* Rimini Tip. Malvolti 1886 p. 259.

Anno 1675. — " A 25 Febbraio, giorno di venerdì, alle ore 7 „ e mezzo (ore 0 e 52 min. del 26 Febbraio in tempo medio di „ Lecce) successe un terribilissimo terremoto che spaventò tutta „ la provincia ed il Regno „.

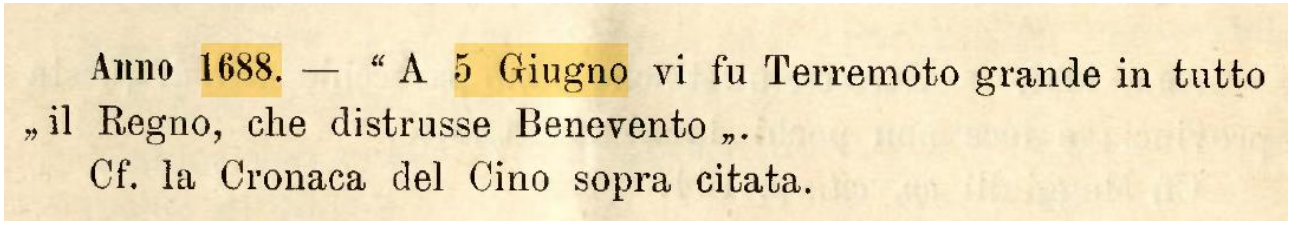
Cf. la Cronaca MS. di Giuseppe Cino, architetto leccese, dal 1656 al 1711, esistente nel Museo provinciale, facendo però la tara sull'intensità di questo fenomeno che produsse soltanto dello spavento.

Friday 8 April 1667 18:55:54 Full Moon 18°53'09 359208.87 km

22/05/1667	23.55	Eclisse parziale. Magnitud. = 0,01	Meridionale	4.43	19.29

Sunday 24 February 1675 15:18:58 New Moon 06°10'26 403224.28 km

25/01/1675	22.23	Eclisse parziale. Magnitud. = 0,04	Settentrionale	7.30	17.17



Anno 1688. — "A 5 Giugno vi fu Terremoto grande in tutto „il Regno, che distrusse Benevento „.
Cf. la Cronaca del Cino sopra citata.

Saturday, May 29, 1688 10:44:49 New Moon 08°46'20 370434.47 km

Saturday, June 5, 1688 22:28:05 First Quarter 15°56'06 402927.09 km

30/04/1688	2.59	Eclisse totale.	Settentrionale	5.06	19.08

24/10/1688	7.46	Eclisse anulare.	Meridionale	6.34	17.14

We have:

31+30+31+31+30+34 =

Input

$31 + 30 + 31 + 31 + 30 + 34$

Result

187

187

(31+30+31+31+30+34)/2

Input

$\frac{1}{2}(31 + 30 + 31 + 31 + 30 + 34)$

Exact result

$$\frac{187}{2}$$

Decimal form

93.5

93.5

April 30, 1688 + 93.5 days

Input interpretation

Friday, April 30, 1688 (Gregorian calendar) + 93.50 days

Result

12:00 pm LMT | Sunday, August 1, 1688

From the April 30 to the August 1 = 31+30+31 = 92. Thus:

April 30, 1688 + 1/2*92 = April 30, 1688 + 46 days

Anno 1694. — " A dì otto Settembre, in giorno di mercoledì,
„ destinato alla festività della beatissima Vergine del Casale ad ore
„ 18 circa (ore 12 e 27 minuti in tempo medio locale) stando l'aria
„ ventosa successe in questa città (di Brindisi) un orrendo terremoto
„ che durò per lo spatio di un Credo prestamente recitato con aver
„ tre volte una dopo l'altra scosso la terra, e fatto tremare le mura
„ delli abitati; e il mare si scommosse, come se fosse stato una
„ fortuna rotta, con aver apportato una puzza di fango che durò
„ più di mezzora continua, con terrore e spavento di tutti li cit-
„ tadini. Per gratia di nostro Signore Gesù Cristo non successe
„ danno alcuno „.

Friday, September 3, 1694 18:44:18 Full Moon 11°35'01 377605.57 km

Saturday, September 11, 1694 12:45:24 Last Quarter 19°07'39 404081.20 km

22/06/1694	17.07	Eclisse anulare.	Settentrionale	4.34	19.48
16/12/1694	17.31	Eclisse totale.	Settentrionale	7.32	16.41

08.09.1694 Very strong earthquake in the province of Brindisi

From 22.06 to the 16.12 , we obtain:

(8+31+31+30+31+30+16)

Input

8 + 31 + 31 + 30 + 31 + 30 + 16

Result

177

177

1/2(8+31+31+30+31+30+16)

Input

$$\frac{1}{2}(8+31+31+30+31+30+16)$$

Exact result

$$\frac{177}{2}$$

Decimal form

88.5

88.5

And:

June 22, 1694 + 88.5 days

Input interpretation

Tuesday, June 22, 1694 (Gregorian calendar) + 88.50 days

Result

12:00 pm LMT | Saturday, September 18, 1694

09.18.1694 (Average between the two eclipses)

Anno 1731. — Si ebbe la funesta notizia che nel suddetto martedì, 20 Marzo, fosse seguito nella città di Foggia così violento terremoto che abbissò due parti della stessa, con la morte di sopra duemila persone... Anco in altre città della Puglia odonsi succedute delle simili disgrazie per tali scosse di terremoto e se ne attendono distinte notizie.

Cf. Documenti del Malvasia. vol. V, p. 193. N. 128.

Anno 1731. — "Nel 19 Marzo di questo anno, festività di „ S. Giuseppe, ad ore nove e mezzo scarse di notte (ore 3 e 44 min. „ del 20 Marzo in tempo medio locale) fece un terribilissimo ter- „ remoto (in Brindisi) che durò 5 Ave Maria; e li vecchi rac- „ contano che se ne ricordavano molti, ma così di durata e scossa „ non se ne ricordavano. Il 21 Marzo mattina di nuovo si fece „ sentire il Terremoto con una scossa ancora grande, e la notte „ seguente per tema molte persone si fecero le baracche nelli giardini. „ Nel Lunedì di Pasqua di Risurrezione si fe sentire di nuovo, „ benchè da otto giorni continui si sentiva, ma non da tutti, come „ furono, dette tre scosse... I danni arrecati alla Cattedrale dal

19-20-21 March 1731

(Spring Equinox ≈ 03.21.1731)

„ terremoto furono riparati l'otto Luglio dello stesso anno col „ danaro raccolto da una pubblica sottoscrizione „.

Cf. Ascoli, *op. cit.*, p. 300, dalle cronache brindisine.

Anno 1731. — Dalle lettere di Napoli si rileva che sebbene il terremoto seguito colà non ha apportato danno veruno, ha fatto però del danno considerevole nelle città e terre di Puglia, avendo replicato un'altra scossa il 17 Settembre.

Cf. Documenti del Malvasia vol. V, p. 194, n. 139.

Anno 1731. — La sera del 25 Ottobre verso le ore tre di notte si intese qui (in Napoli) un'altra leggiera scossa di terremoto; e dalla Puglia si ha che il terremoto del 17 Settembre avea causato gran danno a quelle città nelle fabbriche, e massimamente a Barletta ed a Canosa.

Cf. Documenti del Malvasia vol. V, p. 194. N. 140.

Anno 1731. — Lo sconvolgimento tellurico continuò in questo anno ad angustiare insistentemente la città di Brindisi. Ne successe uno il 17 Settembre alle ore 19 (ore 13 e 11 min. in tempo medio locale); un altro ad ore tre di notte (ore 20 e 57 min. t. m. l.); ed un terzo finalmente il 18 Novembre alle ore otto di notte (ore 0.45 del 19 Novembre in t. m. l.).

Anno 1731. — Si ha da Foggia che la mattina del 30 Dicembre 1731 erasi colà intesa gran scossa di terremoto.... che fu sì grande lo spavento che le campane suonarono da se, ma non cagionò alcun danno; e che lo stesso terremoto fu anche inteso in altre città della Puglia.

Cf. Documenti del Malvasia, vol. V, p. 195. N.° 142. Non lo trovo registrato da nessuno de' cronisti salentini. L'ho notato, come noterò qualche altro nel quale si accenna in generale alla Puglia, allo scopo di facilitare la ricerca a coloro che vorranno occuparsi di questo argomento.

17.09.1731 - 25.10.1731 – 19.11.1731

12.30.1731 Strong earthquake in Foggia

08/01/1731	11.17	Eclisse totale.	Settentrionale	7.38	16.56
04/07/1731	6.48	Eclisse anulare.	Meridionale	4.39	19.48
29/12/1731	1.43	Eclisse totale.	Settentrionale	7.38	16.47

Sunday 16 September 1731 00:10:58 Full Moon 22°33'59 359221.40 km

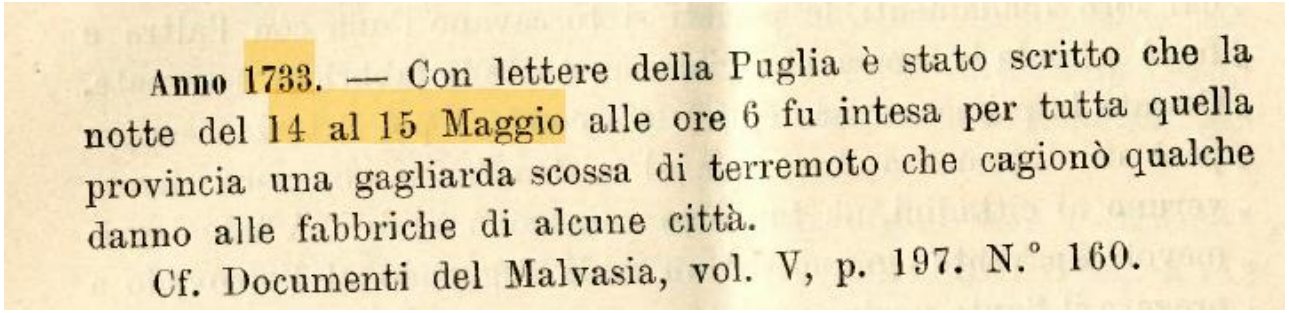
Monday, October 22, 1731 18:16:20 Last Quarter 28°51'17 401243.80 km

Tuesday, October 30, 1731 20:30:20 New Moon 06°56'55 391344.64 km

Tuesday, November 13, 1731 20:58:29 Full Moon 21°02'39 375621.41 km

Wednesday, November 21, 1731 14:59:35 Last Quarter 28°52'22 404246.42 km

Saturday 29 December 1731 00:54:15 New Moon 06°54'54 369056.38 km



Anno 1733. — Con lettere della Puglia è stato scritto che la notte del 14 al 15 Maggio alle ore 6 fu intesa per tutta quella provincia una gagliarda scossa di terremoto che cagionò qualche danno alle fabbriche di alcune città.

Cf. Documenti del Malvasia, vol. V, p. 197. N.° 160.

14-15/05/1733 Strong earthquake in Puglia

13/05/1733	18.22	Eclisse totale.	Settentrionale	4.52	19.21

Wednesday 13 May 1733 17:10:31 New Moon 22°49'42 358422.18 km

Anno 1805. — Terremoto avvenuto in Napoli il 26 Luglio alle ore 10 pom. sussultorio e ondulatorio da N. a S. e poi ripetutosi

alle 4 ant. e alle 12,45 p. del 27. Il centro sismico pare sia stato nel Molise perchè la città d'Isernia è quasi tutta distrutta.

Nella Puglia, nella provincia di Salerno e in quella di Lavoro si è pure sentito ma più leggiero che a Napoli.

Cf. Documenti del Malvasia vol. V, N.° 375, p. 218.

07.26.1805 Strong earthquake in central-southern Italy

26/07/1805	7.13	Eclisse parziale. Magnitud. = 0,14	Meridionale	4.57	19.35

Friday 26 July 1805 06:28:26 New Moon 02°44'14 360681.24 km

Anno 1833. — Il 19 di Gennaio alle ore 12 (ore 5 e 3 min. del 20 Gennaio in tempo medio di Lecce) avvenne un terremoto per tutta la provincia di Lecce preceduto da una burrasca atmosferica.

Anche per questo, come pel terremoto del 1743, fu istituita una festa dedicata al Patrocinio di S. Oronzo, approvata dal papa Gregorio XVI.

19.01.1833 Strong earthquake in the province of Lecce

20/01/1833	23.00	Eclisse anulare.	Meridionale	7.33	17.10

Sunday 20 January 1833 22:04:37 New Moon 00°42'13 406150.76 km

Anno 1856. — Il giorno 12 Ottobre all'una antim. vi fu in Lecce e in tutta la provincia un terremoto ondulatorio in due scosse succedutesi con l'intervallo di circa 10 minuti e della durata di circa 12 secondi.

Per questo terremoto fu anche istituita in Lecce una festa in onore del protettore S. Oronzo, e si celebra nella terza domenica di Ottobre. In questo giorno il popolo si reca sul luogo del martirio del Santo a due chilometri al NW della città, in processione, e nel giorno successivo lo festeggia solennemente nel Duomo.

Cf. S. De Sanctis. *Tradizione e culto dei martiri leccesi Oronzo, Fortunato e Giusto.* Lecce, tip. Lazzaretti, 1890, p. 53.

Anno 1856. — Verso le due ore dopo la mezzanotte dell'11 al 12 Ottobre si intesero in questa capitale (Napoli) due successive scosse di terremoto ondulatorio, la prima nella direzione da N. a S. della durata di 10 secondi. L'atmosfera che nel giorno era stata sempre nebbiosa, alle 3 ant. fu invasa da nebbia densissima.

Le scosse medesime furono intese a Pozzuoli, a Castellammare, non meno che in Bari e in Avellino, giusta i rapporti telegrafici. In nessun luogo vi è stato danno alcuno a deplorare.

11-12/10/1856 forte terremoto Lecce e provincia

29/09/1856	4.58	Eclisse anulare.	Settentrionale	6.05	17.55

Monday 13 October 1856 22:59:16 Full Moon 20°47'38 356887.94 km

Anno 1886. — La sera del 27 Agosto, successivo alla festa del protettore S. Oronzio, fu avvertito in Lecce e nella provincia un fortissimo terremoto.

Nella notte precedente del 26 il cielo era stato coperto di nubi; e dalle 2 alle 4 antim. del 27 vi fu in Lecce un temporale con lampi, tuoni e poca pioggia. Nel mattino del 27 il cielo si andò rasserenando ed alle 9 pom. era totalmente sereno. L'aria fu calma e tranquilla tutto il giorno spirando un debole maestrale che alle 8 pom. si mutò in WSW debolissimo. La pressione barometrica da millim. 751,6 nel mattino, salì la sera a millim. 752,4.

Alle ore 10 e 44 minuti pomer. in tempo medio di Roma (ore 22 e 21 min. tempo medio locale) si avvertì la prima scossa. Fu preceduta e accompagnata da un rombo che io paragonai al rumore prodotto dalle vibrazioni di un treno che traversa una trincea di pietra a grande velocità. Dopo uno o due secondi cominciò la scossa ondulatoria diretta da SE. a NW. Il cono del sismografo cadde al SSE segnando così la provenienza del primo impulso. La durata di questa prima scossa fu di 15 secondi. Le onde di oscillazione furono molto larghe e lente. Io che mi trovavo allora a cena mi sentii spinto innanzi ed avvertii un leggiero movimento di soprammobili; vibrarono le imposte e i vetri delle finestre ed una lampada a petrolio, sospesa alla volta, oscillò lentamente da SE a NW. Questi effetti corrispondono al N.° 4 a 5 della scala de Rossi-Forel. Il pendolo moltiplicatore tracciò sulla lastra affumicata delle larghe ellissoidi con l'asse diretto da SE a NW.

Dopo qualche secondo di pausa succedè la seconda scossa, più intensa della prima. Fu anche ondulatoria, ma accompagnata da leggieri fremiti sussultorii. Il tremolio dei mobili, delle imposte e delle finestre fu più intenso; ed essendo uscito all'aperto nel giardino avvertii un tremito sensibile nelle foglie degli aranci e dei peschi, come se fossero state sbatacchiate nei rami più grossi. Questi effetti corrispondono al N.° 6 della scala de Rossi-Forel. Il

pendolo del Sismografo descrisse delle ellissoidi punteggiate con l'asse maggiore diretto da NE a SW cioè normali a quelle della prima scossa. La seconda durò circa 12 secondi.

La maggior parte della popolazione leccese a questa seconda scossa fuggì spaventata dalle case; alcuni si diressero al Duomo dove organizzarono una processione portando in giro per la città la statua di S. Oronzio; altri uscirono fuori delle mura e pernottarono all'aperto. Non si verificò nessun danno nè alle persone nè agli edificii.

Dalle notizie pervenutemi nei giorni successivi dai Direttori delle stazioni termopluviometriche risulta che il terremoto fu avvertito in tutta la provincia, ma con diversa intensità; maggiore nelle città situate lungo le coste dell'Adriatico e del Jonio, come Brindisi, Otranto, Gallipoli, Taranto, o a breve distanza da esse come Castellaneta, Lecce, ecc.; minore nella zona delle colline nord-occidentali come Ostuni, Ceglie, Martina. Non vi furono danni sensibili, ma per tutto lo spavento è stato orribile.

Il vescovo di Lecce, Mons. Luigi Zola, istituì nello stesso anno una festa religiosa nel Duomo pel 27 Agosto di ogni anno in onore di S. Oronzo.

Anno 1886. — Dal Cav. Mauro Perrone, direttore dell'Osservatorio meteorico di Castellaneta, mi pervennero le seguenti notizie sullo stesso terremoto:

" Castellaneta, 28 Agosto 1886. Iersera alle ore 10 e 50 min. „ si intese qui una fortissima scossa di terremoto. Qualche istante „ prima cominciò a sentirsi un rombo cupo e profondo che crebbe „ poi d'intensità, avvertendosi come una seguela di colpi forti dello „ stantuffo di una locomotiva che vada lentamente.

„ La scossa cominciò con un forte tremito del suolo che andò „ quindi aumentando; poscia diminuì alquanto di forza e quindi „ riprese con maggior lena tanto da sentirsi mancare il suolo sotto „ i piedi. Il tremuoto non mi parve semplicemente ondulatorio; il „ primo periodo più leggiero fu un tremito o scotimento del suolo „ e direi che fu sussultorio.

„ Il secondo, molto più intenso, era composto da questo tre- „ mito e da ondulazioni complessivamente, onde lo direi sussultorio-

„ ondulatorio. La durata totale del fenomeno fu di oltre un mi-
„ nuto primo.

„ Io mi trovavo allora seduto a cena con la famiglia, e perciò
„ ebbi l'agio di marcarne bene le fasi. Due orologii a pendolo posti
„ col quadrante in direzione da SE a NW si fermarono. La popo-
„ lazione spaventata uscì tutta dalle case e pernottò all'aperto.
„ Diversi fabbricati hanno sofferto delle lesioni più o meno gravi
„ con caduta di calcinacci; crollò altresì un fumajuolo. Nel mo-
„ mento del terremoto il cielo era sereno „.

Dalle notizie pubblicate dai giornali risulta che il terremoto fu avvertito in tutta la zona italiana fra l'Appennino e l'Adriatico. Nelle regioni transmarine situate al SE dell'Italia, cioè nelle Isole Jonie e nella Grecia il terremoto fu invece disastroso. A Pyrgos e a Calamata crollarono molte case, e alcuni paesetti furono distrutti.

Sunday 29 August 1886 12:54:22 New Moon 06°04'01 357306.05 km

29/08/1886	13.55	Eclisse totale.	Meridionale	5.32	18.49

Anno 1888. — In questo anno le scosse furono assai frequenti in Terra d'Otranto, ma tutte di lieve intensità. La maggior parte ci fu segnalata dai soli strumenti. Ho creduto di omettere le scosse dell'8 Giugno, del 15 e 17 Luglio, del 2 e 27 Agosto e del 9 e 13 Settembre perchè segnalate dal solo Sismoscopio a verghetta, speditoci dall'Uffizio centrale di meteorologia, e nel quale potei più volte osservare la caduta della verghetta per cause strumentali, indipendenti dalle telluriche.

12/02/1888	0.42	Eclisse parziale. Magnitud. = 0,50	Meridionale	7.11	17.39
09/07/1888	7.29	Eclisse parziale. Magnitud. = 0,49	Meridionale	4.43	19.46
07/08/1888	19.02	Eclisse parziale. Magnitud. = 0,19	Settentrionale	5.10	19.21

Saturday, June 9, 1888 16:34:04 New Moon 19°11'34 401904.05 km

Monday, July 16, 1888 12:12:45 First Quarter 24°18'49 370888.28 km

Monday, July 23, 1888 05:45:07 Full Moon 00°44'14 373412.17 km

Tuesday, August 7, 1888 18:20:55 New Moon 15°35'35 383046.67 km

Tuesday, August 21, 1888 16:20:20 Full Moon 28°58'19 384085.67 km

Wednesday 29 August 1888 14:18:04 Last quarter 06°36'48 403593.18 km

Thursday 6 September 1888 04:56:07 New Moon 13°59'27 372337.24 km

Wednesday 12 September 1888 21:59:57 First quarter 20°31'15 371334.68 km

Anno 1894. — Il 27 Aprile avvenne in Lecce una lievissima scossa ondulatoria alle ore 22 e 21 min. e 15 secondi in tempo medio dell'Europa centrale (ore 22,18 min. e 35 sec. in tempo medio locale); fu registrata dal solo Sismografo con una piccolissima ellissoide diretta da SE a NW.

Nella stessa notte, un' ora prima, era avvenuto in Atene un fortissimo terremoto, segnalatoci col telegrafo ad Otranto.

06/04/1894	4.55	Eclisse anulare.	Settentrionale	5.45	18.41

Friday, April 20, 1894 03:01:37 Full Moon 00°00'31 388179.97 km

Saturday, April 28, 1894 03:20:33 Last Quarter 07°48'24 402434.27 km

Anno 1897. — Il 30 di Giugno si avvertì in Lecce un'altra piccola scossa di terremoto ondulatorio alle ore 15 e 48 min. t. m. E. c. È stata registrata dal Sismografo con la caduta del cono nella direzione di ESE.

Fu sentito in Lecce da parecchie persone ma in ore diverse come d'ordinario suole avvenire nei terremoti diurni molto leggieri. Nella medesima ora fu avvertito con maggiore intensità in Alessano presso il Capo di Leuca.

29/07/1897	16.54	Eclisse anulare.	Meridionale	5.00	19.31

Wednesday 30 June 1897 02:55:15 New Moon 08°31'33 398644.13 km

Anno 1898. — Nel giorno 29 di Giugno alle ore 13 e 15 min. t. m. Europa centrale si è sentita nella provincia di Lecce una leggiera scossa di terremoto ondulatorio della durata di circa due secondi.

Fu registrata dal pendolo moltiplicatore del Sismografo con la direzione da SE a NW. In Lecce fu avvertita da pochissime persone.

Dalle notizie pervenutemi ho rilevato che la maggiore intensità è stata nell'alto Tarantino in Laterza, Ginosa, Mottola e Massafra. A Novoli è stato avvertito con leggiero tremolìo delle imposte e dei soprammobili. Nessuna notizia dalla parte meridionale della provincia.

È stato avvertito a Catania, ad Ischia, a Roma e nella Dalmazia.

Anno 1898. — Il giorno 31 di Luglio sono state avvertite da parecchie persone in Lecce due leggiere scosse di terremoto. La prima è avvenuta alle ore 7 e 40 minuti; la seconda dopo un breve intervallo, ma di intensità minore della precedente. Leggero tremolìo di soprammobili e di corpi sospesi. La direzione del primo impulso è stata da SE. La durata da uno a due secondi.

18/07/1898	20.37	Eclisse anulare.	Meridionale	4.50	19.41

Sunday 3 July 1898 21:12:06 Full Moon 11°52'55 357337.72 km

Tuesday 2 August 1898 04:28:43 Full Moon 09°51'30 360907.71 km

G. Grablovitz. — Sulle registrazioni sismiche del 17 Agosto 1906 in Ischia.

Nelle prime ore del 17 agosto 1906 si ebbero vistose registrazioni in tutte le stazioni sismiche sparse pel globo e non erano trascorse 24 ore che i giornali d' Europa recavano il tremendo annunzio della distruzione di Valparaiso. Niun dubbio poteva a bella prima sorgere che quelle registrazioni fossero dovute non ad altro epicentro che a quello evidentissimo della catastrofe cilena, senonchè qualche speciale caratteristica nei sismogrammi rivelava la sovrapposizione di due terremoti lontani, i cui primi impulsi sarebbero giunti in Europa ad 1^h24^m e ad 1^h59^m incirca. E dopo più attento esame fu tale la mia sicurezza che nella giornata stessa ne diedi comunicazione ufficiale al R. Ufficio Centrale di Meteorologia e Geodinamica con le seguenti fasi approssimative:

	I Terremoto	II Terremoto
Principio	$1^h24.6^m$	$1^h59.7^m$
Seconda fase	1 35.6	2 8.9
Preludio III fase . . .	1 48.0	2 39.0
Principio fase principale	2 5.0	2 49.0
Massimo.	2 10.0	2 52.0
Fine	Indeterminata	3 25.0

From

La fase principale che segue, si compone di belle sinusoidi, il cui periodo da 19ˢ va successivamente decrescendo fino a 15ˢ; essa fa il suo ingresso abbastanza chiaramente negl' istanti seguenti:

	EW	NS
Porto d'Ischia: Vasca	$2^h2^m55^s$	$2^h2^m55^s$
Orizz.	2 3 54	2 3 53
Gr. Sentinella: Vasca	2 3 28	2 3 32
Orizz.	2 3 21	2 3 28
Medie parziali	2 3 25	2 3 27
Media generale	$2^h3^m26^s$	

We consider:

(2h 3m 26s)

Input interpretation

2 hours 3 minutes 26 seconds

Results

2.057 hours

7406 seconds

7406 seconds = 2.057222222222°

From

La seconda fase comincia ai vari apparecchi nei seguenti istanti:

	Vasche		Orizzontali	
	EW	NS	EW	NS
Porto d'Ischia	$2^h\ 9^m58^s$	$2^h\ 9^m53^s$	2^h11^m ?	2^h11^m ?
Gr. Sentinella	2 10 17	2 10 21	2 10 27^s	2 10 27^s

in cui, se si eccettuano gli *orizzontali* al Porto d'Ischia ove il tracciato è dubbioso, l'accordo è insufficiente e se ne può assumere la media in $2^h10^m14^s$.

We consider:

(2h 10m 14s)

Input interpretation

2 hours 10 minutes 14 seconds

Results

2.171 hours

7814 seconds

7814 seconds = 2.170555555556°

From

Il periodo di queste oscillazioni è decresciuto fino a 25ˢ, quando entra la fase delle oscillazioni sinusoidali col periodo di 18ˢ, apprezzabilmente nei seguenti istanti:

	EW	NS
Porto d'Ischia: Vasca	$2^h48^m\ 4^s$	$2^h44^m12^s$
Orizz.	2 44 24	2 44 19
Gr. Sentinella: Vasca	2 43 57	2 44 22
Orizz.	2 43 57	2 44 37
Medie parziali	2 43 50	2 44 22
Media generale	$2^h44^m6^s$	

istante che si può considerare come ingresso della fase principale, i cui due massimi appariscono nei seguenti istanti:

	EW	NS	EW	NS
Porto d'Ischia: Vasca	$2^h51^m\ 0^s=1''6$	$2^h50^m22^s=1''5$	$2^h59^m20^s=1''2$	$2^h56^m12^s=1''5$
Orizz.	2 52 56 = 8.7	2 51 8 = 1.7	3 0 11 = 2.6	2 56 57 = 1.9
Gr. Sentinella: Vasca	2 51 13 = 0.8	2 50 54 = 0.9	2 59 30 = 1.1	2 56 88 = 1.2
Orizz.	2 51 37 = 1.9	2 50 33 = 0.9	2 59 35 = 1.4	2 56 38 = 0.2
Medie parziali	2 51 42	2 50 43	2 5 939	2 56 34
» generali	$2^h51^m12^s$		$2^h58^m6^s$	

We consider:

(2h 44m 6s)

Input interpretation

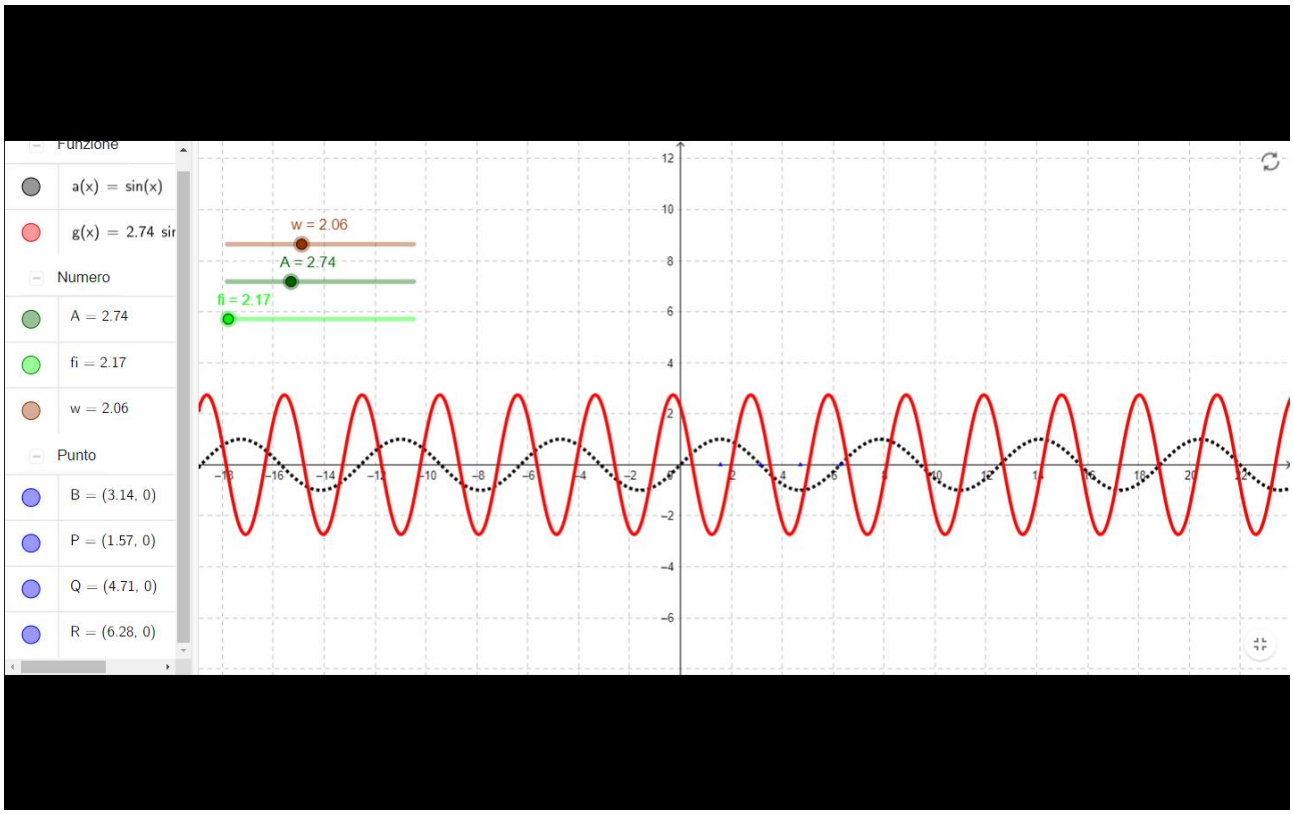
2 hours 44 minutes 6 seconds

Results

2.735 hours

9846 seconds

9846 seconds = 2.735°



From

$$s(t) = A\ \sin(\omega t + \phi)$$

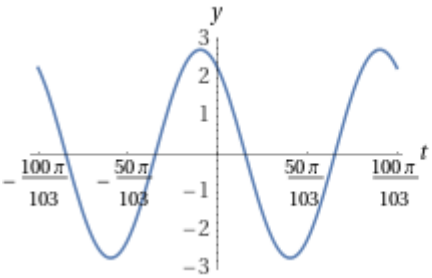
We obtain:

2.74 sin(2.06*t + 2.17)

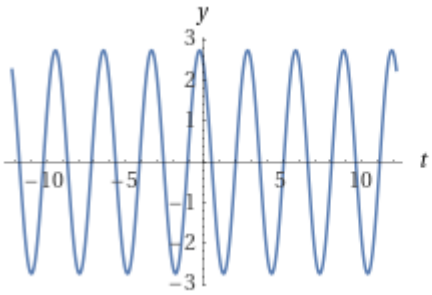
Input

$2.74 \sin(2.06\,t + 2.17)$

Plots (figures that can be related to the open strings)



(t from −3.05 to 3.05)



(t from −12.2 to 12.2)

Alternate form assuming t is real

$2.74 \sin(2.06\,t + 2.17) + 0$

Expanded trigonometric form

$2.26265 \cos(2.06\,t) - 1.54532 \sin(2.06\,t)$

Reduced trigonometric form

$2.26265 \cos(2.06\,t) - 1.54532 \sin(2.06\,t)$

Alternate form

$$(1.13133 - 0.77266\,i)\,e^{(-2.06\,i)\,t} + (1.13133 + 0.77266\,i)\,e^{(2.06\,i)\,t}$$

Roots

$$t = \frac{50\,\pi\,n}{103} - \frac{217}{206}, \quad n \in \mathbb{Z}$$

$\mathbb{Z}$ is the set of integers

Properties as a real function

Domain

$\mathbb{R}$ (all real numbers)

Range

$$\{y \in \mathbb{R} : -\frac{137}{50} \le y \le \frac{137}{50}\}$$

Periodicity

periodic in t with period $\frac{100\,\pi}{103}$

$\mathbb{R}$ is the set of real numbers

Series expansion at t=0

$$2.26265 - 3.18336\,t - 4.80089\,t^2 + 2.25148\,t^3 + 1.69776\,t^4 + O\left(t^5\right)$$

(Taylor series)

Derivative

$$\frac{d}{dt}(2.74\,\sin(2.06\,t + 2.17)) = 5.6444\,\cos(2.06\,t + 2.17)$$

Indefinite integral

$$\int 2.74 \sin(2.06\,t + 2.17)\,dt = 1.09837 \sin(2.06\,t) + 0.750155 \cos(2.06\,t) + \text{constant}$$

Global maxima

$$\max\{2.74 \sin(2.06\,t + 2.17)\} = \frac{137}{50} \text{ at } t = -\frac{217}{206} + \frac{25\,\pi}{103} + \frac{100\,\pi\,n}{103} \text{ for integer } n$$

Global minima

$$\min\{2.74 \sin(2.06\,t + 2.17)\} = -\frac{137}{50} \text{ at } t = -\frac{217}{206} - \frac{25\,\pi}{103} + \frac{100\,\pi\,n}{103} \text{ for integer } n$$

$$\min\{2.74 \sin(2.06\,t + 2.17)\} = -\frac{137}{50} \text{ at } t = -\frac{217}{206} + \frac{75\,\pi}{103} + \frac{100\,\pi\,n}{103} \text{ for integer } n$$

From the indefinite integral result

$$\int 2.74 \sin(2.06\,t + 2.17)\,dt = 1.09837 \sin(2.06\,t) + 0.750155 \cos(2.06\,t) + \text{constant}$$

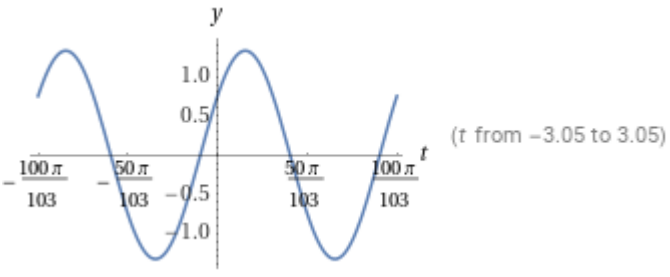
we obtain:

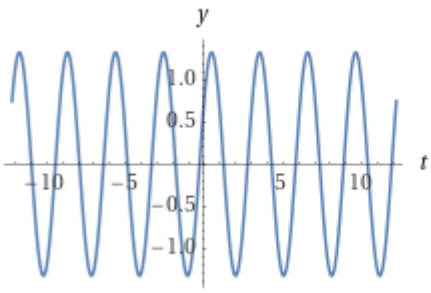
0.750155 cos(2.06 t) + 1.09837 sin(2.06 t)

Input interpretation

$$0.750155 \cos(2.06\,t) + 1.09837 \sin(2.06\,t)$$

Plots (figures that can be related to the open strings)





(t from −12.2 to 12.2)

Alternate forms

$1.33009 \sin(2.06\,t + 0.599206)$

$0.750155\,(1.46419 \sin(2.06\,t) + \cos(2.06\,t))$

$0.000035\,(31\,382 \sin(2.06\,t) + 21\,433 \cos(2.06\,t))$

Roots

$$t = \frac{50}{103}\left(\pi n - \tan^{-1}\left(\frac{21\,433}{31\,382}\right)\right), \quad n \in \mathbb{Z}$$

$\tan^{-1}(x)$ is the inverse tangent function

$\mathbb{Z}$ is the set of integers

Properties as a real function

Domain

$\mathbb{R}$ (all real numbers)

Range

$$\left\{y \in \mathbb{R} : \frac{1}{200\,000} 7 \left(31\,382 \sin\left(2 \tan^{-1}\left(\frac{-21\,433 - \sqrt{1\,444\,203\,413}}{31\,382}\right)\right) + 21\,433 \cos\left(2 \tan^{-1}\left(\frac{21\,433}{31\,382} + \frac{\sqrt{1\,444\,203\,413}}{31\,382}\right)\right)\right) \leq y \leq \frac{1}{200\,000} 7 \left(31\,382 \sin\left(2 \tan^{-1}\left(\frac{\sqrt{1\,444\,203\,413} - 21\,433}{31\,382}\right)\right) + 21\,433 \cos\left(2 \tan^{-1}\left(\frac{\sqrt{1\,444\,203\,413} - 21\,433}{31\,382}\right)\right)\right)\right\}$$

Periodicity

periodic in t with period $\frac{100\,\pi}{103}$

$\mathbb{R}$ is the set of real numbers

Series expansion at t=0

$$0.750155 + 2.26264\,t - 1.59168\,t^2 - 1.60029\,t^3 + 0.562871\,t^4 + O\left(t^5\right)$$

(Taylor series)

Derivative

$$\frac{d}{dt}(1.09837 \sin(2.06\,t) + 0.750155 \cos(2.06\,t)) = 2.26264 \cos(2.06\,t) - 1.54532 \sin(2.06\,t)$$

Indefinite integral

$$\int \left(0.750155 \cos(2.06\,t) + 1.09837 \sin(2.06\,t)\right) dt = 0.364153 \sin(2.06\,t) - 0.533189 \cos(2.06\,t) + \text{constant}$$

Global maxima

$$\max\{1.09837\sin(2.06\,t) + 0.750155\cos(2.06\,t)\} = \frac{7\sqrt{1\,444\,203\,413}}{200\,000} \text{ at } t = \frac{100}{103}$$

$$\tan^{-1}\left(\frac{31\,382}{21\,433 + \sqrt{1\,444\,203\,413}}\right) + \frac{100\,\pi\,n}{103} \text{ for integer } n$$

Global minima

$$\min\{1.09837\sin(2.06\,t) + 0.750155\cos(2.06\,t)\} = -\frac{7\sqrt{1\,444\,203\,413}}{200\,000} \text{ at } t = \frac{100}{103}$$

$$\tan^{-1}\left(\frac{31\,382}{21\,433 - \sqrt{1\,444\,203\,413}}\right) + \frac{100\,\pi\,n}{103} \text{ for integer } n$$

Again, from the indefinite integral result

$$\int \left(0.750155\cos(2.06\,t) + 1.09837\sin(2.06\,t)\right) dt =$$
$$0.364153\sin(2.06\,t) - 0.533189\cos(2.06\,t) + \text{constant}$$

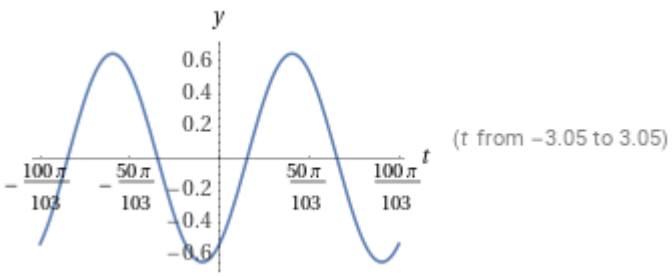
we obtain:

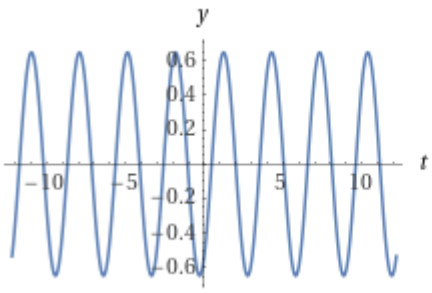
-0.533189 cos(2.06 t) + 0.364153 sin(2.06 t)

Input interpretation

$$-0.533189\cos(2.06\,t) + 0.364153\sin(2.06\,t)$$

Plots (figures that can be related to the open strings)





(t from −12.2 to 12.2)

Alternate forms

$-0.645676 \sin(0.97159 - 2.06\,t)$

$-0.645676 \sin(2.06\,t + 2.17)$

$-0.533189\,(\cos(2.06\,t) - 0.682972 \sin(2.06\,t))$

Roots

$t \approx 0.485437\,(3.14159\,n + 0.97159)\,, \quad n \in \mathbb{Z}$

$\mathbb{Z}$ is the set of integers

Properties as a real function

Domain

$\mathbb{R}$ (all real numbers)

Range

$$\left\{y \in \mathbb{R} : \frac{1}{1\,000\,000}\left(364\,153 \sin\left(2 \tan^{-1}\left(\frac{533\,189}{364\,153} - \frac{\sqrt{416\,897\,917\,130}}{364\,153}\right)\right) - 533\,189 \cos\left(2 \tan^{-1}\left(\frac{533\,189}{364\,153} - \frac{\sqrt{416\,897\,917\,130}}{364\,153}\right)\right)\right) \le y \le \frac{1}{1\,000\,000}\left(364\,153 \sin\left(2 \tan^{-1}\left(\frac{533\,189 + \sqrt{416\,897\,917\,130}}{364\,153}\right)\right) - 533\,189 \cos\left(2 \tan^{-1}\left(\frac{533\,189 + \sqrt{416\,897\,917\,130}}{364\,153}\right)\right)\right)\right\}$$

$\mathbb{R}$ is the set of real numbers

$\tan^{-1}(x)$ is the inverse tangent function

Series expansion at t=0

$$-0.533189 + 0.750155\,t + 1.13132\,t^2 - 0.53056\,t^3 - 0.400073\,t^4 + O\left(t^5\right)$$

(Taylor series)

Derivative

$$\frac{d}{dt}(0.364153 \sin(2.06\,t) - 0.533189 \cos(2.06\,t)) = 1.09837 \sin(2.06\,t) + 0.750155 \cos(2.06\,t)$$

Indefinite integral

$$\int \left(-0.533189 \cos(2.06\,t) + 0.364153 \sin(2.06\,t)\right) dt = -0.25883 \sin(2.06\,t) - 0.176773 \cos(2.06\,t) + \text{constant}$$

Global maxima

$$\max\{0.364153\sin(2.06\,t) - 0.533189\cos(2.06\,t)\} = \frac{\sqrt{\frac{41\,689\,791\,713}{10}}}{100\,000} \text{ at } t = \frac{100}{103}\tan^{-1}\left(\frac{364\,153}{-533\,189 + \sqrt{416\,897\,917\,130}}\right) + \frac{100\,\pi\,n}{103} \text{ for integer } n$$

Global minima

$$\min\{0.364153\sin(2.06\,t) - 0.533189\cos(2.06\,t)\} = -\frac{\sqrt{\frac{41\,689\,791\,713}{10}}}{100\,000} \text{ at } t = -\frac{100}{103}\tan^{-1}\left(\frac{364\,153}{533\,189 + \sqrt{416\,897\,917\,130}}\right) + \frac{100\,\pi\,n}{103} \text{ for integer } n$$

From the indefinite integral result

$$\int\left(-0.533189\cos(2.06\,t) + 0.364153\sin(2.06\,t)\right)dt = -0.25883\sin(2.06\,t) - 0.176773\cos(2.06\,t) + \text{constant}$$

-0.176773 cos(2.06 t) - 0.25883 sin(2.06 t)

for t = 1:

-0.176773 cos(2.06) - 0.25883 sin(2.06)

Input interpretation

$$-0.176773\cos(2.06) - 0.25883\sin(2.06)$$

Result

−0.145401425028729146190815840974143859502756096969681612386862755 …

-0.145401425028…

Alternative representations

$$\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06) = -0.176773\cosh(2.06\,i) - 0.25883\cos\left(-2.06 + \frac{\pi}{2}\right)$$

$$\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06) = -0.176773\cosh(-2.06\,i) - 0.25883\cos\left(-2.06 + \frac{\pi}{2}\right)$$

$$\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06) = -0.176773\cosh(-2.06\,i) + 0.25883\cos\left(2.06 + \frac{\pi}{2}\right)$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representation

$$\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06) = \sum_{k=0}^{\infty}(-1)^k\, e^{1.44541\,k}\left(-\frac{0.176773}{(2\,k)!} - \frac{0.53319}{(1+2\,k)!}\right)$$

$$\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06) = \sum_{k=0}^{\infty}(-1)^k\left(-0.51766\,J_{1+2\,k}(2.06) - \frac{0.176773\,e^{1.44541\,k}}{(2\,k)!}\right)$$

$$\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06) = \sum_{k=0}^{\infty}(-1)^k\left(-0.51766\,J_{1+2\,k}(2.06) + \frac{0.176773\left(2.06 - \frac{\pi}{2}\right)^{1+2\,k}}{(1+2\,k)!}\right)$$

$n!$ is the factorial function

$J_n(z)$ is the Bessel function of the first kind

Integral representations

$$\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06) = -0.176773 + \int_0^1 (-0.53319\cos(2.06\,t) + 0.364152\sin(2.06\,t))\,dt$$

$$\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06) = \int_0^1 \left(-0.53319\cos(2.06\,t) - 0.0883865\,(-4.12+\pi)\sin\left(0 - \frac{1}{2}\pi\,(-1+t) + 2.06\,t\right)\right) dt$$

$$\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06) = \int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} -\frac{0.0883865\,e^{-1.0609/s+s}\,(1.50812+s)\,\sqrt{\pi}}{i\,\pi\,s^{3/2}}\,ds \quad \text{for } \gamma > 0$$

From which:

-18(-0.176773 cos(2.06) - 0.25883 sin(2.06))-1

Input interpretation

$$-18\,(-0.176773\cos(2.06) - 0.25883\sin(2.06)) - 1$$

Result

1.617225650517124631434685137534589471049609745454269022963529590 8…

1.6172256505171…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternative representations

$$-18\,(\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06)) - 1 = \\ -1 - 18\left(-0.176773\cosh(2.06\,i) - 0.25883\cos\left(-2.06 + \frac{\pi}{2}\right)\right)$$

$$-18\,(\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06)) - 1 = \\ -1 - 18\left(-0.176773\cosh(-2.06\,i) - 0.25883\cos\left(-2.06 + \frac{\pi}{2}\right)\right)$$

$$-18\,(\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06)) - 1 = \\ -1 - 18\left(-0.176773\cosh(-2.06\,i) + 0.25883\cos\left(2.06 + \frac{\pi}{2}\right)\right)$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations

$$-18\,(\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06)) - 1 = \\ -1. + \sum_{k=0}^{\infty}(-1)^k\, e^{1.44541\,k}\left(\frac{3.18191}{(2\,k)!} + \frac{9.59742}{(1+2\,k)!}\right)$$

$$-18\,(\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06)) - 1 = \\ -1 + \sum_{k=0}^{\infty}(-1)^k\left(9.31788\,J_{1+2\,k}(2.06) + \frac{3.18191\,e^{1.44541\,k}}{(2\,k)!}\right)$$

$$-18\,(\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06)) - 1 = \\ -1 + \sum_{k=0}^{\infty}(-1)^k\left(9.31788\,J_{1+2\,k}(2.06) - \frac{3.18191\left(2.06 - \frac{\pi}{2}\right)^{1+2\,k}}{(1+2\,k)!}\right)$$

$n!$ is the factorial function

$J_n(z)$ is the Bessel function of the first kind

Integral representations

$$-18\,(\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06)) - 1 = 2.18191 + \int_0^1 (9.59742\cos(2.06\,t) - 6.55474\sin(2.06\,t))\,dt$$

$$-18\,(\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06)) - 1 = -1 + \int_0^1 \left(9.59742\cos(2.06\,t) + 1.59096\,(-4.12+\pi)\sin\left(0 - \frac{1}{2}\pi\,(-1+t) + 2.06\,t\right)\right)dt$$

$$-18\,(\cos(2.06)\,(-1)\,0.176773 - 0.25883\sin(2.06)) - 1 = -1 + \int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{1.59096\,e^{-1.0609/s+s}\,(1.50812+s)\,\sqrt{\pi}}{i\,\pi\,s^{3/2}}\,ds \quad \text{for } \gamma > 0$$

Now, we have:

Gr. Sentinella: Vasca $2\ 51\ 13 = 0.8$ $2\ 50\ 54 = 0.9$

Mean $2^h 51^m 12^s$

2h 51m 13s

Input interpretation

2 hours 51 minutes 13 seconds

Results

2.854 hours

10273 seconds

10273 seconds = 2.853611111111°

2h 50m 54s

Input interpretation

2 hours 50 minutes 54 seconds

Results

2.848 hours

10254 seconds

10254 seconds = 2.848333333333°

2h 51m 12s

Input interpretation

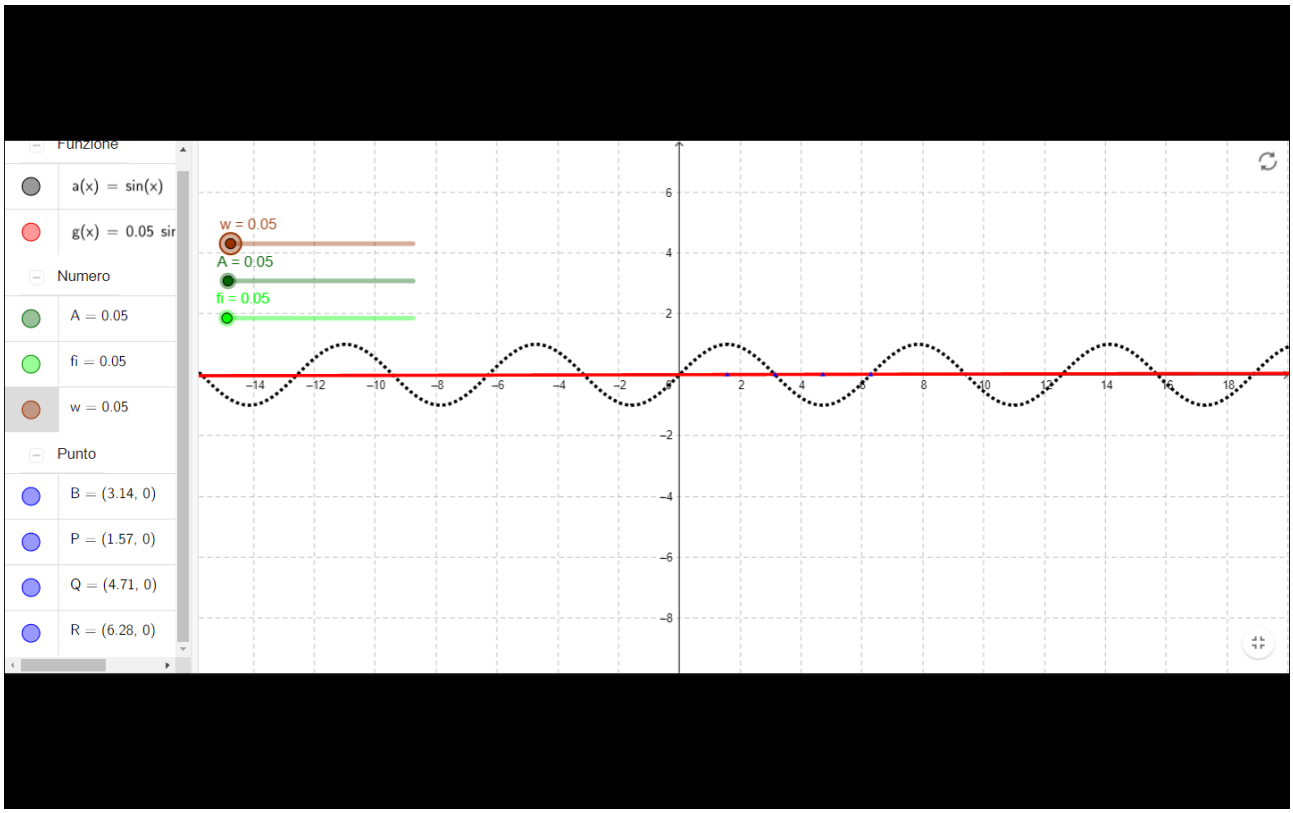
2 hours 51 minutes 12 seconds

Results

2.853 hours

10272 seconds

10272 seconds = 2.853333333333°



From

$$s(t) = A\ \sin(\omega t + \phi)$$

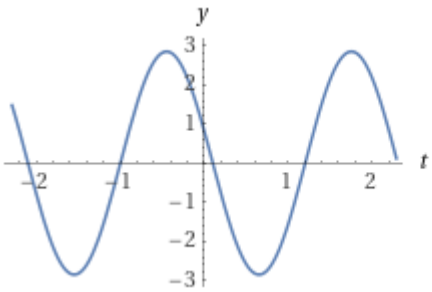
We obtain:

2.85361 sin(2.85333*t +2.848333)

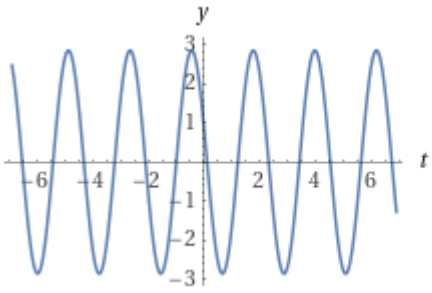
Input interpretation

$2.85361 \sin(2.85333\, t + 2.848333)$

Plots (figures that can be related to the open strings)



(t from −2.3 to 2.3)



(t from −6.9 to 6.9)

Alternate form assuming t is real

$2.85361 \sin(2.85333\, t + 2.84833) + 0$

Expanded trigonometric form

$0.824905 \cos(2.85333\, t) - 2.73178 \sin(2.85333\, t)$

Alternate form

$(0.412453 - 1.36589\, i)\, e^{(-2.85333\, i)\, t} + (0.412453 + 1.36589\, i)\, e^{(2.85333\, i)\, t}$

Roots

$t \approx 1.10103\, n - 2.09928\,, \quad n \in \mathbb{Z}$

$\mathbb{Z}$ is the set of integers

Properties as a real function

Domain

$\mathbb{R}$ (all real numbers)

Range

$$\{y \in \mathbb{R} : -\frac{285\,361}{100\,000} \leq y \leq \frac{285\,361}{100\,000}\}$$

$\mathbb{R}$ is the set of real numbers

Series expansion at t=0

$$0.824905 - 7.79467\,t - 3.35798\,t^2 + 10.5767\,t^3 + 2.27825\,t^4 + O(t^5)$$

(Taylor series)

Derivative

$$\frac{d}{dt}(2.85361 \sin(2.85333\,t + 2.84833)) = 8.14229 \cos(2.85333\,t + 2.84833)$$

Indefinite integral

$$\int 2.85361 \sin(2.85333\,t + 2.848333)\,dt =$$
$$0.289103 \sin(2.85333\,t) + 0.957401 \cos(2.85333\,t) + \text{constant}$$

Global maxima

$$\max\{2.85361 \sin(2.85333\,t + 2.84833)\} = \frac{285\,361}{100\,000} \text{ at } t = -\frac{2\,848\,333}{2\,853\,330} + \frac{50\,000\,\pi}{285\,333} + \frac{200\,000\,\pi\,n}{285\,333} \text{ for integer } n$$

Global minima

$$\min\{2.85361\sin(2.85333\,t+2.84833)\} = -\frac{285\,361}{100\,000} \text{ at } t = -\frac{2\,848\,333}{2\,853\,330} - \frac{50\,000\,\pi}{285\,333} + \frac{200\,000\,\pi\,n}{285\,333} \text{ for integer } n$$

$$\min\{2.85361\sin(2.85333\,t+2.84833)\} = -\frac{285\,361}{100\,000} \text{ at } t = -\frac{2\,848\,333}{2\,853\,330} + \frac{50\,000\,\pi}{95\,111} + \frac{200\,000\,\pi\,n}{285\,333} \text{ for integer } n$$

From the indefinite integral result

$$\int 2.85361\sin(2.85333\,t+2.848333)\,dt = 0.289103\sin(2.85333\,t) + 0.957401\cos(2.85333\,t) + \text{constant}$$

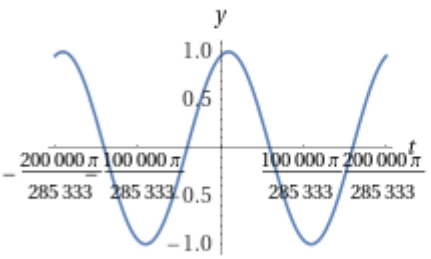
we obtain:

0.957401 cos(2.85333 t) + 0.289103 sin(2.85333 t)

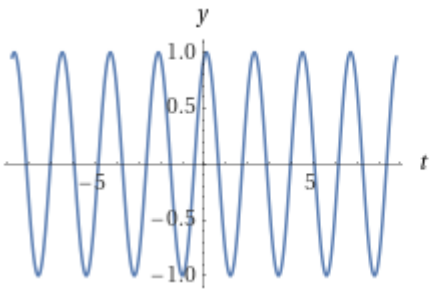
Input interpretation

$$0.957401\cos(2.85333\,t) + 0.289103\sin(2.85333\,t)$$

Plots (figures that can be related to the open strings)



(t from −2.202 to 2.202)



(t from −8.808 to 8.808)

Alternate forms

$1.0001 \sin(2.85333\, t + 1.27754)$

$0.957401\,(0.301966 \sin(2.85333\, t) + \cos(2.85333\, t))$

$1 \times 10^{-6}\,(289\,103 \sin(2.85333\, t) + 957\,401 \cos(2.85333\, t))$

Roots

$t \approx 0.350468\,(3.14159\, n - 1.27754)\,, \quad n \in \mathbb{Z}$

$\mathbb{Z}$ is the set of integers

Properties as a real function

Domain

$\mathbb{R}$ (all real numbers)

Range

$$\left\{y \in \mathbb{R} : \frac{1}{1\,000\,000}\left(289\,103 \sin\left(2 \tan^{-1}\left(\frac{-957\,401 - \sqrt{1\,000\,197\,219\,410}}{289\,103}\right)\right) + 957\,401 \cos\left(2 \tan^{-1}\left(\frac{957\,401}{289\,103} + \frac{\sqrt{1\,000\,197\,219\,410}}{289\,103}\right)\right)\right) \le y \le \frac{1}{1\,000\,000}\left(289\,103 \sin\left(2 \tan^{-1}\left(\frac{\sqrt{1\,000\,197\,219\,410} - 957\,401}{289\,103}\right)\right) + 957\,401 \cos\left(2 \tan^{-1}\left(\frac{\sqrt{1\,000\,197\,219\,410} - 957\,401}{289\,103}\right)\right)\right)\right\}$$

$\mathbb{R}$ is the set of real numbers

$\tan^{-1}(x)$ is the inverse tangent function

Series expansion at t=0

$$0.957401 + 0.824906\,t - 3.89734\,t^2 - 1.11933\,t^3 + 2.64418\,t^4 + O\left(t^5\right)$$

(Taylor series)

Derivative

$$\frac{d}{dt}(0.289103 \sin(2.85333\,t) + 0.957401 \cos(2.85333\,t)) = 0.824906 \cos(2.85333\,t) - 2.73178 \sin(2.85333\,t)$$

Indefinite integral

$$\int \left(0.957401 \cos(2.85333\,t) + 0.289103 \sin(2.85333\,t)\right) dt = 0.335538 \sin(2.85333\,t) - 0.101321 \cos(2.85333\,t) + \text{constant}$$

Global maxima

$$\max\{0.289103 \sin(2.85333\, t) + 0.957401 \cos(2.85333\, t)\} = \frac{\sqrt{\frac{100\,019\,721\,941}{10}}}{100\,000} \text{ at } t = \frac{200\,000 \tan^{-1}\left(\frac{289\,103}{957\,401 + \sqrt{1\,000\,197\,219\,410}}\right)}{285\,333} + \frac{200\,000\,\pi\, n}{285\,333} \text{ for integer } n$$

Global minima

$$\min\{0.289103 \sin(2.85333\, t) + 0.957401 \cos(2.85333\, t)\} = -\frac{\sqrt{\frac{100\,019\,721\,941}{10}}}{100\,000} \text{ at } t = \frac{200\,000 \tan^{-1}\left(\frac{289\,103}{957\,401 - \sqrt{1\,000\,197\,219\,410}}\right)}{285\,333} + \frac{200\,000\,\pi\, n}{285\,333} \text{ for integer } n$$

Again, from the indefinite integral result

$$\int \left(0.957401 \cos(2.85333\, t) + 0.289103 \sin(2.85333\, t)\right) dt = 0.335538 \sin(2.85333\, t) - 0.101321 \cos(2.85333\, t) + \text{constant}$$

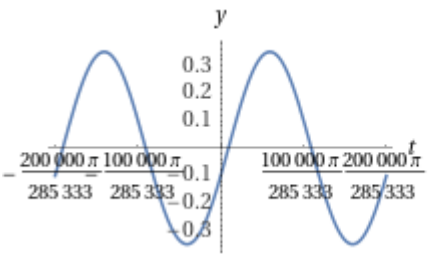
we obtain:

-0.101321 cos(2.85333 t) + 0.335538 sin(2.85333 t)

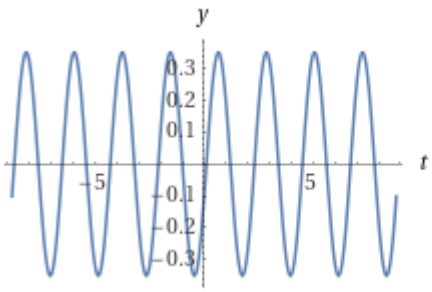
Input interpretation

$$-0.101321 \cos(2.85333\, t) + 0.335538 \sin(2.85333\, t)$$

Plots (figures that can be related to the open strings)



(t from −2.202 to 2.202)



(t from −8.808 to 8.808)

Alternate forms

$-0.350502 \sin(0.293259 - 2.85333\, t)$

$-0.350502 \sin(2.85333\, t + 2.84833)$

$-0.101321 \left(\cos(2.85333\, t) - 3.31163 \sin(2.85333\, t)\right)$

Roots

$$t = \frac{100\,000\left(\pi n + \tan^{-1}\left(\frac{101\,321}{335\,538}\right)\right)}{285\,333}, \quad n \in \mathbb{Z}$$

$\tan^{-1}(x)$ is the inverse tangent function

$\mathbb{Z}$ is the set of integers

Properties as a real function

Domain

$\mathbb{R}$ (all real numbers)

Range

$$\{y \in \mathbb{R} : \frac{1}{1\,000\,000}\left(335\,538 \sin\left(2 \tan^{-1}\left(\frac{101\,321}{335\,538} - \frac{\sqrt{122\,851\,694\,485}}{335\,538}\right)\right) - 101\,321 \cos\left(2 \tan^{-1}\left(\frac{101\,321}{335\,538} - \frac{\sqrt{122\,851\,694\,485}}{335\,538}\right)\right)\right) \le y \le \frac{1}{1\,000\,000}\left(335\,538 \sin\left(2 \tan^{-1}\left(\frac{101\,321 + \sqrt{122\,851\,694\,485}}{335\,538}\right)\right) - 101\,321 \cos\left(2 \tan^{-1}\left(\frac{101\,321 + \sqrt{122\,851\,694\,485}}{335\,538}\right)\right)\right)\}$$

Periodicity

periodic in t with period $\frac{200000\,\pi}{285333}$

$\mathbb{R}$ is the set of real numbers

Series expansion at t=0

$$-0.101321 + 0.957401\,t + 0.412452\,t^2 - 1.29911\,t^3 - 0.279831\,t^4 + O\left(t^5\right)$$

(Taylor series)

Derivative

$$\frac{d}{dt}(0.335538 \sin(2.85333\,t) - 0.101321 \cos(2.85333\,t)) = 0.289102 \sin(2.85333\,t) + 0.957401 \cos(2.85333\,t)$$

Indefinite integral

$$\int \left(-0.101321 \cos(2.85333\,t) + 0.335538 \sin(2.85333\,t)\right) dt = -0.0355097 \sin(2.85333\,t) - 0.117595 \cos(2.85333\,t) + \text{constant}$$

Global maxima

$$\max\{0.335538\sin(2.85333\,t) - 0.101321\cos(2.85333\,t)\} = \frac{\sqrt{\frac{24\,570\,338\,897}{5}}}{200\,000} \text{ at } t = \frac{200\,000\tan^{-1}\left(\frac{335\,538}{-101\,321+\sqrt{122\,851\,694\,485}}\right)}{285\,333} + \frac{200\,000\,\pi\,n}{285\,333} \text{ for integer } n$$

Global minima

$$\min\{0.335538\sin(2.85333\,t) - 0.101321\cos(2.85333\,t)\} = -\frac{\sqrt{\frac{24\,570\,338\,897}{5}}}{200\,000} \text{ at } t = -\frac{200\,000\tan^{-1}\left(\frac{335\,538}{101\,321+\sqrt{122\,851\,694\,485}}\right)}{285\,333} + \frac{200\,000\,\pi\,n}{285\,333} \text{ for integer } n$$

From the indefinite integral result

$$\int\left(-0.101321\cos(2.85333\,t) + 0.335538\sin(2.85333\,t)\right)dt = -0.0355097\sin(2.85333\,t) - 0.117595\cos(2.85333\,t) + \text{constant}$$

-0.117595 cos(2.85333 t) - 0.0355097 sin(2.85333 t)

for t = 1:

-0.117595 cos(2.85333) - 0.0355097 sin(2.85333)

Input interpretation

$$-0.117595\cos(2.85333) + \sin(2.85333)\times(-0.0355097)$$

Result

0.102647993589337258282755358732562095866047438896734946396233783 1

…

0.102647993589….

Alternative representations

$$\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333) = -0.117595\cosh(2.85333\,i) - 0.0355097\cos\left(-2.85333 + \frac{\pi}{2}\right)$$

$$\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333) = -0.117595\cosh(-2.85333\,i) - 0.0355097\cos\left(-2.85333 + \frac{\pi}{2}\right)$$

$$\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333) = -0.117595\cosh(-2.85333\,i) + 0.0355097\cos\left(2.85333 + \frac{\pi}{2}\right)$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations

$$\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333) = \sum_{k=0}^{\infty}(-1)^k\, e^{2.09697\,k}\left(-\frac{0.117595}{(2\,k)!} - \frac{0.101321}{(1+2\,k)!}\right)$$

$$\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333) = \sum_{k=0}^{\infty}(-1)^k\left(-0.0710194\,J_{1+2\,k}(2.85333) - \frac{0.117595\,e^{2.09697\,k}}{(2\,k)!}\right)$$

$$\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333) = \sum_{k=0}^{\infty}(-1)^k\left(-0.0710194\,J_{1+2\,k}(2.85333) + \frac{0.117595\left(2.85333 - \frac{\pi}{2}\right)^{1+2\,k}}{(1+2\,k)!}\right)$$

$n!$ is the factorial function

$J_n(z)$ is the Bessel function of the first kind

Integral representations

$$\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333) = -0.117595 + \int_0^1 (-0.101321\cos(2.85333\,t) + 0.335537\sin(2.85333\,t))\,dt$$

$$\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333) = \int_0^1 \left(-0.101321\cos(2.85333\,t) - 0.0587975\,(-5.70666+\pi)\sin\left(0 - \frac{1}{2}\pi\,(-1+t) + 2.85333\,t\right)\right) dt$$

$$\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333) = \int_{-i\infty+\gamma}^{i\infty+\gamma} -\frac{0.0587975\,e^{-2.03537/s+s}\,(0.430804+s)\,\sqrt{\pi}}{i\,\pi\,s^{3/2}}\,ds \quad \text{for } \gamma > 0$$

From which:

16(-0.117595 cos(2.85333) - 0.0355097 sin(2.85333))

Input interpretation

$$16\,(-0.117595\cos(2.85333) + \sin(2.85333)\times(-0.0355097))$$

Result

1.64236789742939613252408573972099353385675902234775914233974052 99…

1.642367897…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternative representations

$$16\,(\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333)) = 16\left(-0.117595\cosh(2.85333\,i) - 0.0355097\cos\left(-2.85333 + \frac{\pi}{2}\right)\right)$$

$$16\,(\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333)) = 16\left(-0.117595\cosh(-2.85333\,i) - 0.0355097\cos\left(-2.85333 + \frac{\pi}{2}\right)\right)$$

$$16\,(\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333)) = 16\left(-0.117595\cosh(-2.85333\,i) + 0.0355097\cos\left(2.85333 + \frac{\pi}{2}\right)\right)$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations

$$16\,(\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333)) = \sum_{k=0}^{\infty}(-1)^k\,e^{2.09697\,k}\left(-\frac{1.88152}{(2\,k)!} - \frac{1.62113}{(1+2\,k)!}\right)$$

$$16\,(\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333)) = \sum_{k=0}^{\infty}(-1)^k\left(-1.13631\,J_{1+2\,k}(2.85333) - \frac{1.88152\,e^{2.09697\,k}}{(2\,k)!}\right)$$

$$16\,(\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333)) = \sum_{k=0}^{\infty}(-1)^k\left(-1.13631\,J_{1+2\,k}(2.85333) + \frac{1.88152\left(2.85333 - \frac{\pi}{2}\right)^{1+2\,k}}{(1+2\,k)!}\right)$$

$n!$ is the factorial function

$J_n(z)$ is the Bessel function of the first kind

Integral representations

$$16\,(\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333)) = -1.88152 + \int_0^1 (-1.62113\cos(2.85333\,t) + 5.3686\sin(2.85333\,t))\,dt$$

$$16\,(\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333)) = \int_0^1 \left(-1.62113\cos(2.85333\,t) - 0.94076\,(-5.70666+\pi)\sin\left(0 - \frac{1}{2}\pi\,(-1+t) + 2.85333\,t\right)\right) dt$$

$$16\,(\cos(2.85333)\,(-1)\,0.117595 - 0.0355097\sin(2.85333)) = \int_{-i\infty+\gamma}^{i\infty+\gamma} -\frac{0.94076\,e^{-2.03537/s+s}\,(0.430804+s)\,\sqrt{\pi}}{i\,\pi\,s^{3/2}}\,ds \quad \text{for } \gamma > 0$$

We consider:

Porto d'Ischia: Vasca	$2^h48^m\ 4^s$	$2^h44^m12^s$
		$2^h44^m6^s$

2h 48m 4s

Input interpretation

2 hours 48 minutes 4 seconds

Results

2.801 hours

10084 seconds

10084 seconds = 2.801111111111°

2h 44m 12s

Input interpretation

2 hours 44 minutes 12 seconds

Results

2.737 hours

9852 seconds

9852 seconds = 2.736666666667°

2h 44m 8s

Input interpretation

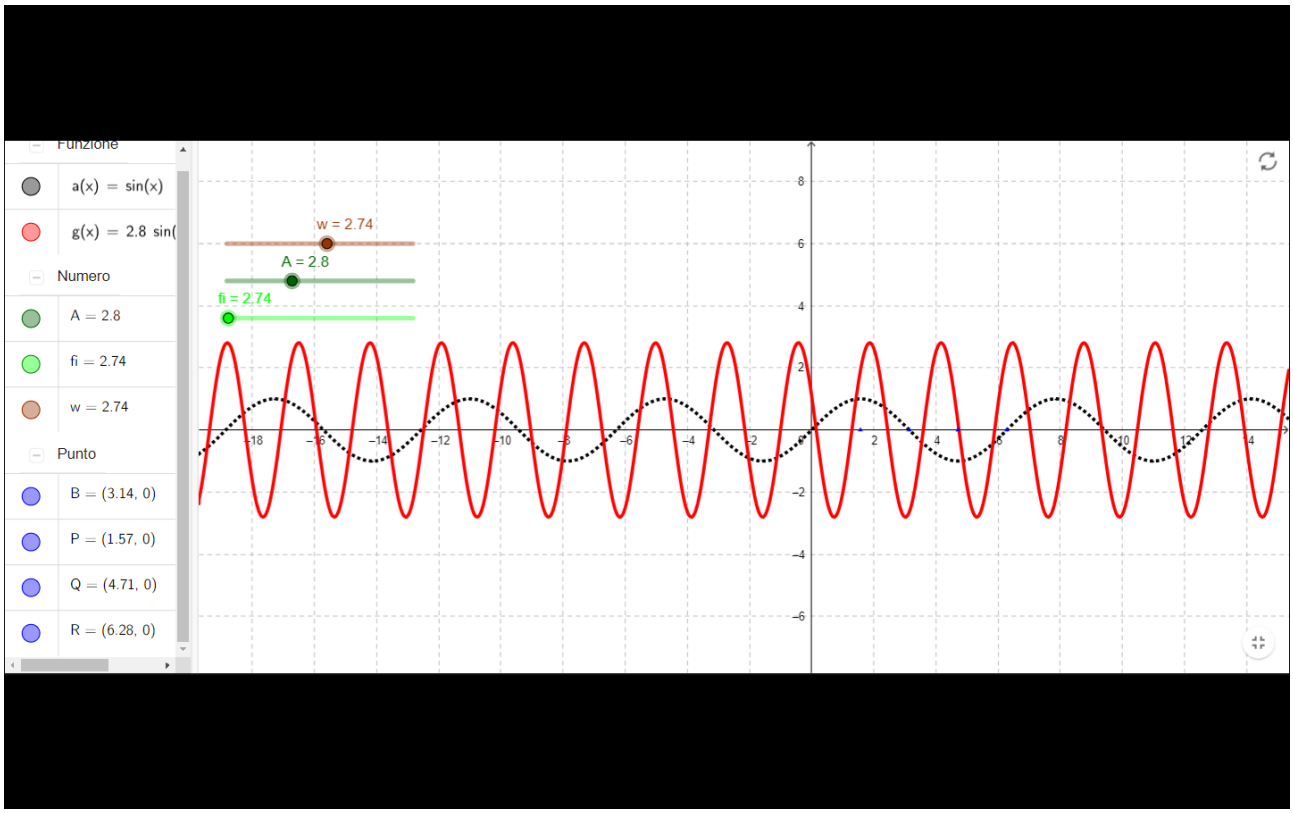
2 hours 44 minutes 8 seconds

Results

2.736 hours

9848 seconds

9848 seconds = 2.735555555556°



From

$$s(t) = A\ \sin(\omega t + \phi)$$

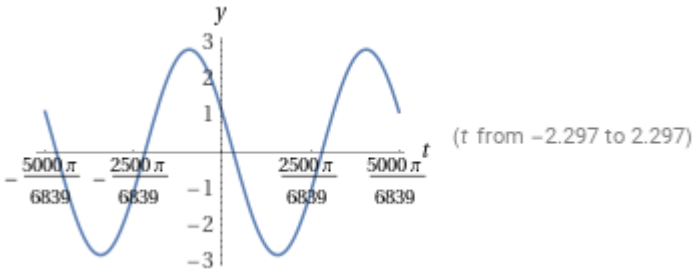
We obtain:

2.8011 sin(2.7356*t + 2.7367)

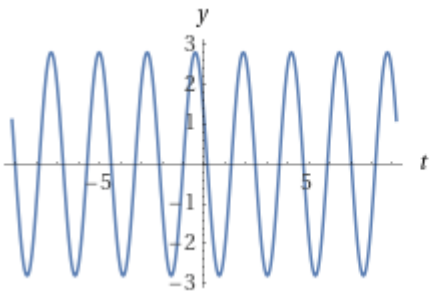
Input interpretation

$2.8011 \sin(2.7356\, t + 2.7367)$

Plots **(figures that can be related to the open strings)**



(t from −2.297 to 2.297)



(t from −9.187 to 9.187)

Alternate form assuming t is real

$$2.8011 \sin(2.7356\,t + 2.7367) + 0$$

Expanded trigonometric form

$$1.10341 \cos(2.7356\,t) - 2.57462 \sin(2.7356\,t)$$

Reduced trigonometric form

$$1.10341 \cos(2.7356\,t) - 2.57462 \sin(2.7356\,t)$$

Alternate form

$$(0.551705 - 1.28731\,i)\,e^{(-2.7356\,i)\,t} + (0.551705 + 1.28731\,i)\,e^{(2.7356\,i)\,t}$$

Roots

$$t = \frac{2500\,\pi\,n}{6839} - \frac{27367}{27356}, \quad n \in \mathbb{Z}$$

$\mathbb{Z}$ is the set of integers

Properties as a real function

Domain

$\mathbb{R}$ (all real numbers)

Range

$$\{y \in \mathbb{R} : -\frac{28011}{10000} \leq y \leq \frac{28011}{10000}\}$$

Periodicity

periodic in t with period $\frac{5000\,\pi}{6839}$

$\mathbb{R}$ is the set of real numbers

Series expansion at t=0

$$1.10341 - 7.04312\,t - 4.12869\,t^2 + 8.78454\,t^3 + 2.57475\,t^4 + O\left(t^5\right)$$

(Taylor series)

Derivative

$$\frac{d}{dt}(2.8011\sin(2.7356\,t + 2.7367)) = 7.66269\cos(2.7356\,t + 2.7367)$$

Indefinite integral

$$\int 2.8011\sin(2.7356\,t + 2.7367)\,dt =$$
$$0.403352\sin(2.7356\,t) + 0.941152\cos(2.7356\,t) + \text{constant}$$

Global maxima

$$\max\{2.8011\sin(2.7356\,t + 2.7367)\} = \frac{28011}{10000} \text{ at } t = -\frac{27367}{27356} + \frac{1250\,\pi}{6839} + \frac{5000\,\pi\,n}{6839}$$

for integer n

Global minima

$$\min\{2.8011\sin(2.7356t+2.7367)\} = -\frac{28011}{10000} \text{ at } t = -\frac{27367}{27356} - \frac{1250\pi}{6839} + \frac{5000\pi n}{6839} \text{ for integer } n$$

$$\min\{2.8011\sin(2.7356t+2.7367)\} = -\frac{28011}{10000} \text{ at } t = -\frac{27367}{27356} + \frac{3750\pi}{6839} + \frac{5000\pi n}{6839} \text{ for integer } n$$

From the indefinite integral result

$$\int 2.8011\sin(2.7356t+2.7367)\,dt = 0.403352\sin(2.7356t) + 0.941152\cos(2.7356t) + \text{constant}$$

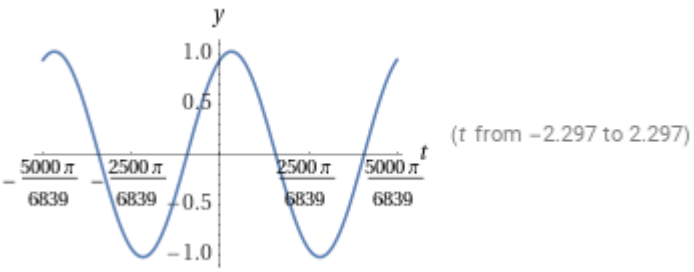
we obtain:

0.941152 cos(2.7356 t) + 0.403352 sin(2.7356 t)

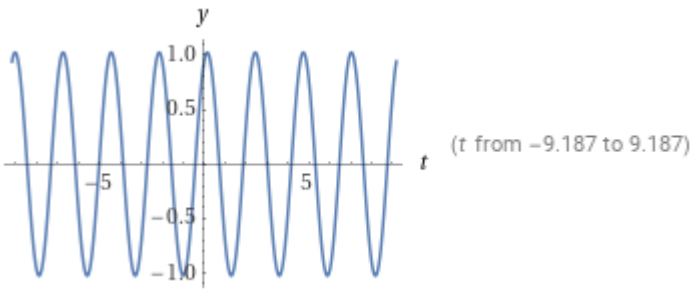
Input interpretation

$$0.941152\cos(2.7356t) + 0.403352\sin(2.7356t)$$

Plots (figures that can be related to the open strings)



(t from −2.297 to 2.297)



(t from −9.187 to 9.187)

Alternate forms

$1.02394 \sin(2.7356\,t + 1.1659)$

$0.941152\,(0.428573 \sin(2.7356\,t) + \cos(2.7356\,t))$

$8 \times 10^{-6}\,(50\,419 \sin(2.7356\,t) + 117\,644 \cos(2.7356\,t))$

Roots

$$t = \frac{2500\left(\pi n - \tan^{-1}\left(\frac{117\,644}{50\,419}\right)\right)}{6839}, \quad n \in \mathbb{Z}$$

$\tan^{-1}(x)$ is the inverse tangent function

$\mathbb{Z}$ is the set of integers

Properties as a real function

Domain

$\mathbb{R}$ (all real numbers)

Range

$$\{y \in \mathbb{R} : \frac{1}{125\,000}\left(50\,419 \sin\left(2\tan^{-1}\left(\frac{-117\,644 - \sqrt{16\,382\,186\,297}}{50\,419}\right)\right) + 117\,644 \cos\left(2\tan^{-1}\left(\frac{117\,644}{50\,419} + \frac{\sqrt{16\,382\,186\,297}}{50\,419}\right)\right)\right) \le y \le \frac{1}{125\,000}\left(50\,419 \sin\left(2\tan^{-1}\left(\frac{\sqrt{16\,382\,186\,297} - 117\,644}{50\,419}\right)\right) + 117\,644 \cos\left(2\tan^{-1}\left(\frac{\sqrt{16\,382\,186\,297} - 117\,644}{50\,419}\right)\right)\right)\}$$

Periodicity

periodic in t with period $\frac{5000\,\pi}{6839}$

$\mathbb{R}$ is the set of real numbers

Series expansion at t=0

$$0.941152 + 1.10341\,t - 3.52156\,t^2 - 1.37623\,t^3 + 2.19613\,t^4 + O\left(t^5\right)$$

(Taylor series)

Derivative

$$\frac{d}{dt}(0.403352\sin(2.7356\,t) + 0.941152\cos(2.7356\,t)) =$$
$$1.10341\cos(2.7356\,t) - 2.57462\sin(2.7356\,t)$$

Indefinite integral

$$\int \left(0.941152\cos(2.7356\,t) + 0.403352\sin(2.7356\,t)\right) dt =$$
$$0.344039\sin(2.7356\,t) - 0.147446\cos(2.7356\,t) + \text{constant}$$

Global maxima

$$\max\{0.403352\sin(2.7356\,t) + 0.941152\cos(2.7356\,t)\} = \frac{\sqrt{16\,382\,186\,297}}{125\,000} \text{ at } t =$$
$$\frac{5000\tan^{-1}\left(\frac{50\,419}{117\,644+\sqrt{16\,382\,186\,297}}\right)}{6839} + \frac{5000\,\pi\,n}{6839} \text{ for integer } n$$

Global minima

$$\min\{0.403352\sin(2.7356\,t) + 0.941152\cos(2.7356\,t)\} = -\frac{\sqrt{16\,382\,186\,297}}{125\,000} \text{ at } t =$$
$$\frac{5000\tan^{-1}\left(\frac{50\,419}{117\,644-\sqrt{16\,382\,186\,297}}\right)}{6839} + \frac{5000\,\pi\,n}{6839} \text{ for integer } n$$

Again, from the indefinite integral result

$$\int (0.941152\cos(2.7356\,t) + 0.403352\sin(2.7356\,t))\,dt =$$
$$0.344039\sin(2.7356\,t) - 0.147446\cos(2.7356\,t) + \text{constant}$$

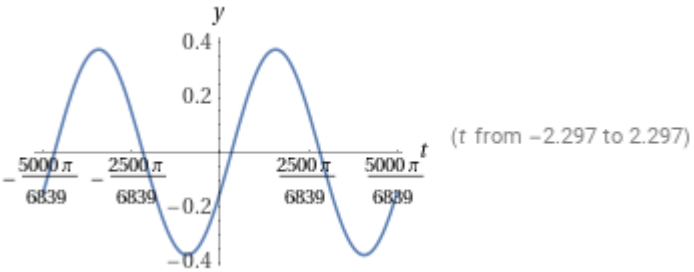
we obtain:

-0.147446 cos(2.7356 t) + 0.344039 sin(2.7356 t)

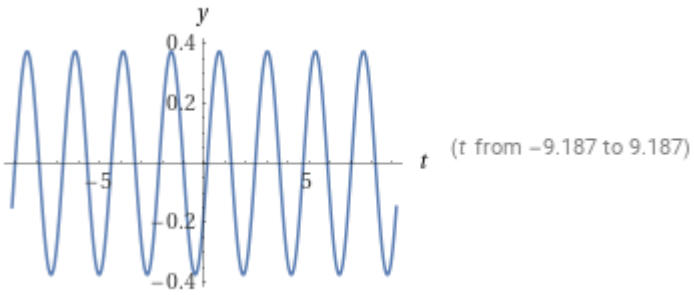
Input interpretation

$$-0.147446\cos(2.7356\,t) + 0.344039\sin(2.7356\,t)$$

Plots **(figures that can be related to the open strings)**



(t from −2.297 to 2.297)



(t from −9.187 to 9.187)

Alternate forms

$$-0.374304\sin(0.404894 - 2.7356\,t)$$

$$-0.374304\sin(2.7356\,t + 2.7367)$$

$$-0.147446\,(\cos(2.7356\,t) - 2.33332\sin(2.7356\,t))$$

Roots

$$t \approx 0.365551\,(3.14159\,n + 0.404894)\,, \quad n \in \mathbb{Z}$$

$\mathbb{Z}$ is the set of integers

Properties as a real function

Domain

$\mathbb{R}$ (all real numbers)

Range

$$\{y \in \mathbb{R} : \frac{1}{1\,000\,000}\left(344\,039 \sin\left(2 \tan^{-1}\left(\frac{147\,446}{344\,039} - \frac{\sqrt{140\,103\,156\,437}}{344\,039}\right)\right) - 147\,446 \cos\left(2 \tan^{-1}\left(\frac{147\,446}{344\,039} - \frac{\sqrt{140\,103\,156\,437}}{344\,039}\right)\right)\right) \le y \le \frac{1}{1\,000\,000}\left(344\,039 \sin\left(2 \tan^{-1}\left(\frac{147\,446 + \sqrt{140\,103\,156\,437}}{344\,039}\right)\right) - 147\,446 \cos\left(2 \tan^{-1}\left(\frac{147\,446 + \sqrt{140\,103\,156\,437}}{344\,039}\right)\right)\right)\}$$

$\mathbb{R}$ is the set of real numbers

$\tan^{-1}(x)$ is the inverse tangent function

Series expansion at t=0

$$-0.147446 + 0.941153\,t + 0.551707\,t^2 - 1.17385\,t^3 - 0.344058\,t^4 + O\left(t^5\right)$$

(Taylor series)

Derivative

$$\frac{d}{dt}(0.344039 \sin(2.7356\,t) - 0.147446 \cos(2.7356\,t)) = 0.403353 \sin(2.7356\,t) + 0.941153 \cos(2.7356\,t)$$

Indefinite integral

$$\int \left(-0.147446 \cos(2.7356\, t) + 0.344039 \sin(2.7356\, t)\right) dt = -0.053899 \sin(2.7356\, t) - 0.125764 \cos(2.7356\, t) + \text{constant}$$

Global maxima

$$\max\{0.344039 \sin(2.7356\, t) - 0.147446 \cos(2.7356\, t)\} = \frac{\sqrt{140\,103\,156\,437}}{1\,000\,000} \text{ at } t = \frac{5000 \tan^{-1}\left(\frac{344039}{-147\,446 + \sqrt{140\,103\,156\,437}}\right)}{6839} + \frac{5000\,\pi\, n}{6839} \text{ for integer } n$$

Global minima

$$\min\{0.344039 \sin(2.7356\, t) - 0.147446 \cos(2.7356\, t)\} = -\frac{\sqrt{140\,103\,156\,437}}{1\,000\,000} \text{ at } t = -\frac{5000 \tan^{-1}\left(\frac{344039}{147\,446 + \sqrt{140\,103\,156\,437}}\right)}{6839} + \frac{5000\,\pi\, n}{6839} \text{ for integer } n$$

From the indefinite integral result

$$\int \left(-0.147446 \cos(2.7356\, t) + 0.344039 \sin(2.7356\, t)\right) dt = -0.053899 \sin(2.7356\, t) - 0.125764 \cos(2.7356\, t) + \text{constant}$$

we obtain, for t = 1:

-0.125764 cos(2.7356) - 0.053899 sin(2.7356)

Input interpretation

$$-0.125764 \cos(2.7356) - 0.053899 \sin(2.7356)$$

Result

0.094254366137860027679683707768675286106521520599127392957400316 4

…

0.09425436613786….

Alternative representations

$$\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356) = -0.125764\cosh(2.7356\,i) - 0.053899\cos\left(-2.7356 + \frac{\pi}{2}\right)$$

$$\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356) = -0.125764\cosh(-2.7356\,i) - 0.053899\cos\left(-2.7356 + \frac{\pi}{2}\right)$$

$$\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356) = -0.125764\cosh(-2.7356\,i) + 0.053899\cos\left(2.7356 + \frac{\pi}{2}\right)$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations

$$\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356) = \sum_{k=0}^{\infty}(-1)^k\, e^{2.0127\,k}\left(-\frac{0.125764}{(2\,k)!} - \frac{0.147446}{(1+2\,k)!}\right)$$

$$\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356) = \sum_{k=0}^{\infty}(-1)^k\left(-0.107798\,J_{1+2\,k}(2.7356) - \frac{0.125764\, e^{2.0127\,k}}{(2\,k)!}\right)$$

$$\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356) = \sum_{k=0}^{\infty}(-1)^k\left(-0.107798\,J_{1+2k}(2.7356) + \frac{0.125764\left(2.7356 - \frac{\pi}{2}\right)^{1+2k}}{(1+2k)!}\right)$$

$n!$ is the factorial function

$J_n(z)$ is the Bessel function of the first kind

Integral representations

$$\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356) = -0.125764 + \int_0^1 (-0.147446\cos(2.7356\,t) + 0.34404\sin(2.7356\,t))\,dt$$

$$\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356) = \int_0^1 \left(-0.147446\cos(2.7356\,t) - 0.062882\,(-5.4712+\pi)\sin\left(0 - \frac{1}{2}\pi\,(-1+t) + 2.7356\,t\right)\right)dt$$

$$\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356) = \int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} -\frac{0.062882\,e^{-1.87088/s+s}\,(0.586202+s)\,\sqrt{\pi}}{i\,\pi\,s^{3/2}}\,ds \quad \text{for } \gamma > 0$$

From which:

sqrt(29(-0.125764 cos(2.7356) - 0.053899 sin(2.7356)))

Input interpretation

$$\sqrt{29\,(-0.125764\cos(2.7356) - 0.053899\sin(2.7356))}$$

Result

1.653292659512507725786788047517858653629015295461912210347512308 4

…

1.6532926595125…. result very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3$ = 1164.2696 i.e. 1.6557845...

All 2nd roots of 2.73338

$1.65329\, e^{0} \approx 1.6533$ (real, principal root)

$1.65329\, e^{i\pi} \approx -1.6533$ (real root)

Alternative representations

$$\sqrt{29\,(\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356))} = \sqrt{29\left(-0.125764\cosh(2.7356\,i) - 0.053899\cos\left(-2.7356 + \frac{\pi}{2}\right)\right)}$$

$$\sqrt{29\,(\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356))} = \sqrt{29\left(-0.125764\cosh(-2.7356\,i) - 0.053899\cos\left(-2.7356 + \frac{\pi}{2}\right)\right)}$$

$$\sqrt{29\,(\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356))} = \sqrt{29\left(-0.125764\cosh(-2.7356\,i) + 0.053899\cos\left(2.7356 + \frac{\pi}{2}\right)\right)}$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations

$$\sqrt{29\,(\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356))} = \exp\left(i\,\pi\left\lfloor\frac{\arg(-x - 3.64716\cos(2.7356) - 1.56307\sin(2.7356))}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\,x^{-k}\left(-\frac{1}{2}\right)_k\,(-x - 3.64716\cos(2.7356) - 1.56307\sin(2.7356))^k}{k!}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\sqrt{29\,(\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356))} = \left(\frac{1}{z_0}\right)^{1/2\,\lfloor\arg(-3.64716\cos(2.7356) - 1.56307\sin(2.7356) - z_0)/(2\,\pi)\rfloor}\,z_0^{1/2\,(1+\lfloor\arg(-3.64716\cos(2.7356) - 1.56307\sin(2.7356) - z_0)/(2\,\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\,(-3.64716\cos(2.7356) - 1.56307\sin(2.7356) - z_0)^k\,z_0^{-k}}{k!}$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

Integral representations

$$\sqrt{29\,(\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356))} = \sqrt{-3.64716 + \int_0^1 (-4.27594\cos(2.7356\,t) + 9.97716\sin(2.7356\,t))\,dt}$$

$$\sqrt{29\,(\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356))} = \sqrt{\left(\int_0^1\left(-4.27594\cos(2.7356\,t) - 1.82358\,(-5.4712 + \pi)\sin\left(0 - \frac{1}{2}\,\pi\,(-1 + t) + 2.7356\,t\right)\right)dt\right)}$$

$$\sqrt{29\,(\cos(2.7356)\,(-1)\,0.125764 - 0.053899\sin(2.7356))} = \sqrt{\frac{\sqrt{\pi}}{i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} -\frac{1.82358\,e^{-1.87088/s+s}\,(0.586202+s)}{s^{3/2}}\,ds} \quad \text{for } \gamma > 0$$

Soltanto l'osservatorio d'Apia nell'arcipelago di Samoa, quasi ai nostri antipodi, distingue letteralmente due terremoti e ne rilevo le seguenti fasi principali, cioè:

	I	II
P =	1h 21m 48s	1h 49m 42s e 1h 54m 42s
S =	1 30 27	2 1 54 » 2 6 42
L =	1 36 —	2h 8m 0s
M_1 =	1 39 54	2 25 42 *
M_2 =	1 43 24 *	2 28 0

Now, we consider:

1h 21m 48s

Input interpretation

1 hour 21 minutes 48 seconds

Results

1.363 hours

4908 seconds

4908 seconds = 1.363333333333°

1h 49m 42s

Input interpretation

1 hour 49 minutes 42 seconds

Results

1.828 hours

6582 seconds

6582 seconds = 1.828333333333°

1h 54m 42s

Input interpretation

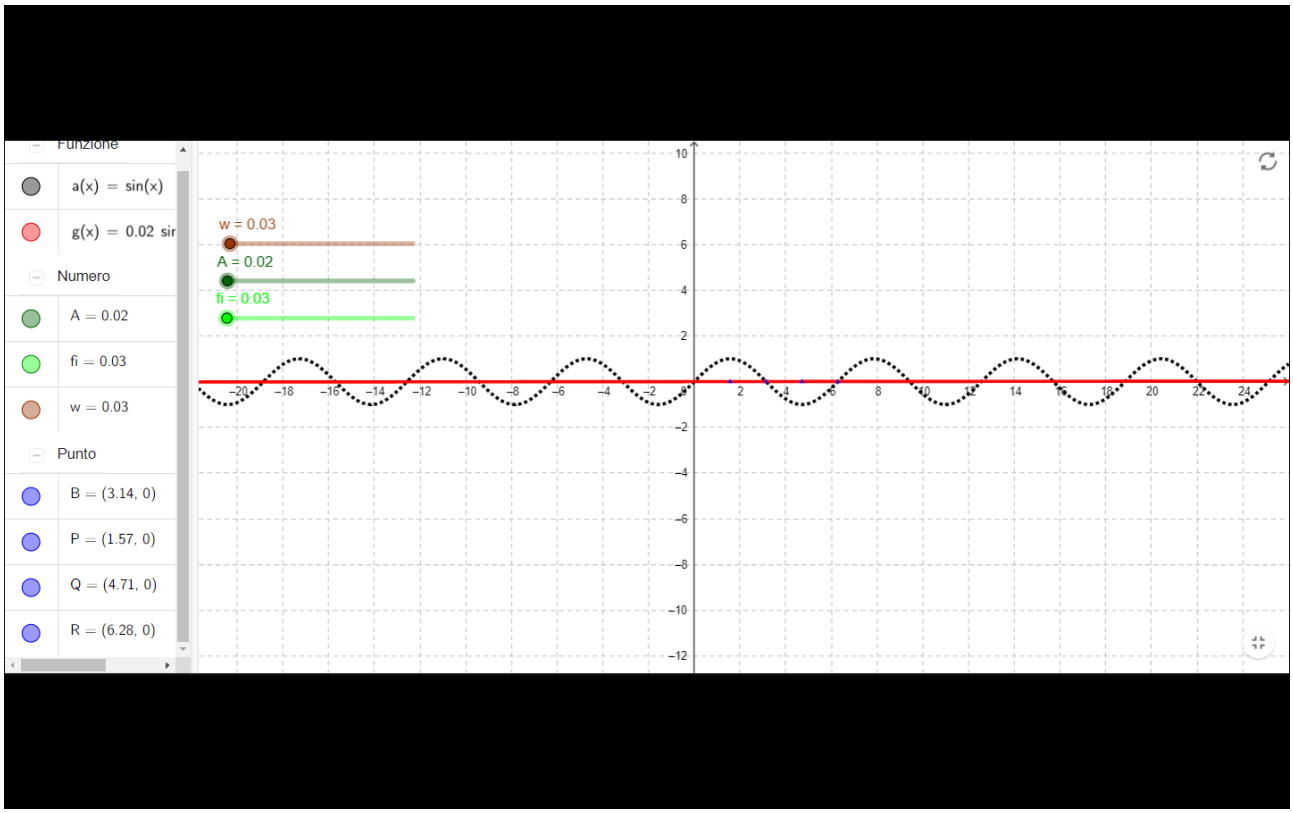
1 hour 54 minutes 42 seconds

Results

1.912 hours

6882 seconds

6882 seconds = 1.911666666667°



From

$$s(t) = A\ \sin(\omega t + \phi)$$

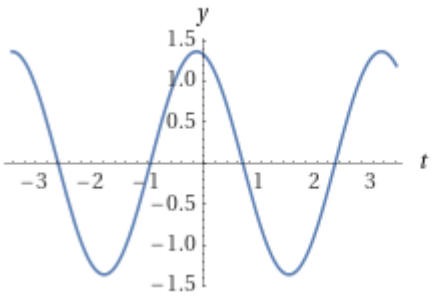
We obtain:

1.36333 sin(1.911666*t +1.828333)

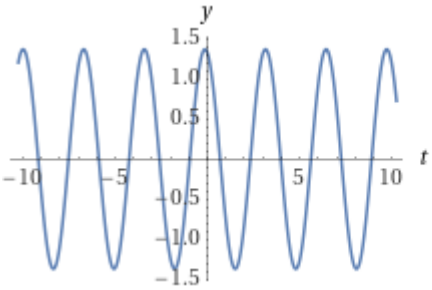
Input interpretation

$1.36333 \sin(1.911666\, t + 1.828333)$

Plots (figures that can be related to the open strings)



(t from −3.4 to 3.4)



(t from −10.3 to 10.3)

Alternate form assuming t is real

$$1.36333 \sin(1.91167\, t + 1.82833) + 0$$

Expanded trigonometric form

$$1.31837 \cos(1.91167\, t) - 0.347239 \sin(1.91167\, t)$$

Reduced trigonometric form

$$1.31837 \cos(1.91167\, t) - 0.347239 \sin(1.91167\, t)$$

Alternate form

$$(0.659184 - 0.17362\, i)\, e^{(-1.91167\, i)\, t} + (0.659184 + 0.17362\, i)\, e^{(1.91167\, i)\, t}$$

Roots

$$t \approx 1.64338\, n - 0.956408\,, \quad n \in \mathbb{Z}$$

$\mathbb{Z}$ is the set of integers

Properties as a real function

Domain

$\mathbb{R}$ (all real numbers)

Range

$$\{y \in \mathbb{R} : -\frac{136\,333}{100\,000} \leq y \leq \frac{136\,333}{100\,000}\}$$

$\mathbb{R}$ is the set of real numbers

Series expansion at t=0

$$1.31837 - 0.663805\,t - 2.40897\,t^2 + 0.404309\,t^3 + 0.733624\,t^4 + O(t^5)$$

(Taylor series)

Derivative

$$\frac{d}{dt}(1.36333 \sin(1.91167\,t + 1.82833)) = 2.60623 \cos(1.91167\,t + 1.82833)$$

Indefinite integral

$$\int 1.36333 \sin(1.911666\,t + 1.828333)\,dt =$$
$$0.689643 \sin(1.91167\,t) + 0.181642 \cos(1.91167\,t) + \text{constant}$$

Global maxima

$$\max\{1.36333 \sin(1.91167\,t + 1.82833)\} = \frac{136\,333}{100\,000} \text{ at } t = -\frac{1\,828\,333}{1\,911\,666} + \frac{250\,000\,\pi}{955\,833} + \frac{1\,000\,000\,\pi\,n}{955\,833} \text{ for integer } n$$

Global minima

$$\min\{1.36333\sin(1.91167t + 1.82833)\} = -\frac{136333}{100000} \text{ at } t = -\frac{1828333}{1911666} - \frac{250000\pi}{955833} + \frac{1000000\pi n}{955833} \text{ for integer } n$$

$$\min\{1.36333\sin(1.91167t + 1.82833)\} = -\frac{136333}{100000} \text{ at } t = -\frac{1828333}{1911666} + \frac{250000\pi}{318611} + \frac{1000000\pi n}{955833} \text{ for integer } n$$

From the indefinite integral result

$$\int 1.36333\sin(1.911666t + 1.828333)\,dt = 0.689643\sin(1.91167t) + 0.181642\cos(1.91167t) + \text{constant}$$

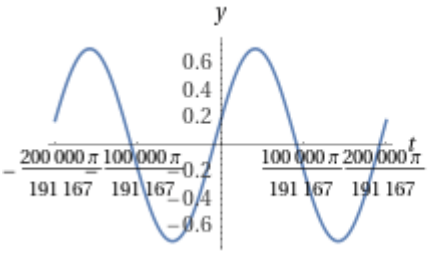
we obtain:

0.181642 cos(1.91167 t) + 0.689643 sin(1.91167 t)

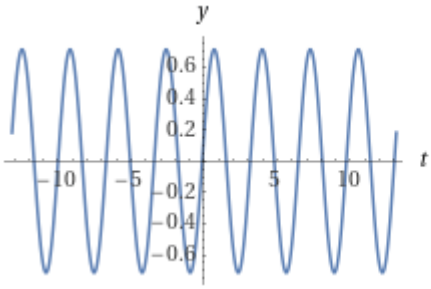
Input interpretation

$$0.181642\cos(1.91167t) + 0.689643\sin(1.91167t)$$

Plots (figures that can be related to the open strings)



(t from −3.287 to 3.287)



(t from −13.15 to 13.15)

Alternate forms

$$0.713163 \sin(1.91167\,t + 0.257537)$$

$$0.181642\,(3.79672 \sin(1.91167\,t) + \cos(1.91167\,t))$$

$$1 \times 10^{-6}\,(689\,643 \sin(1.91167\,t) + 181\,642 \cos(1.91167\,t))$$

Roots

$$t \approx 0.523103\,(3.14159\,n - 0.257537)\,, \quad n \in \mathbb{Z}$$

$\mathbb{Z}$ is the set of integers

Properties as a real function

Domain

$\mathbb{R}$ (all real numbers)

Range

$$\left\{y \in \mathbb{R} : \frac{1}{1\,000\,000}\left(689\,643 \sin\left(2 \tan^{-1}\left(\frac{-181\,642 - \sqrt{508\,601\,283\,613}}{689\,643}\right)\right) + 181\,642 \cos\left(2 \tan^{-1}\left(\frac{181\,642}{689\,643} + \frac{\sqrt{508\,601\,283\,613}}{689\,643}\right)\right)\right) \le y \le \frac{1}{1\,000\,000}\left(689\,643 \sin\left(2 \tan^{-1}\left(\frac{\sqrt{508\,601\,283\,613} - 181\,642}{689\,643}\right)\right) + 181\,642 \cos\left(2 \tan^{-1}\left(\frac{\sqrt{508\,601\,283\,613} - 181\,642}{689\,643}\right)\right)\right)\right\}$$

$\mathbb{R}$ is the set of real numbers

$\tan^{-1}(x)$ is the inverse tangent function

Series expansion at t=0

$$0.181642 + 1.31837\,t - 0.331904\,t^2 - 0.802993\,t^3 + 0.101078\,t^4 + O\left(t^5\right)$$

(Taylor series)

Derivative

$$\frac{d}{dt}(0.689643\sin(1.91167\,t) + 0.181642\cos(1.91167\,t)) =$$
$$1.31837\cos(1.91167\,t) - 0.34724\sin(1.91167\,t)$$

Indefinite integral

$$\int \left(0.181642\cos(1.91167\,t) + 0.689643\sin(1.91167\,t)\right) dt =$$
$$0.0950174\sin(1.91167\,t) - 0.360754\cos(1.91167\,t) + \text{constant}$$

Global maxima

$$\max\{0.689643\sin(1.91167\,t) + 0.181642\cos(1.91167\,t)\} = \frac{\sqrt{508\,601\,283\,613}}{1\,000\,000} \text{ at}$$
$$t = \frac{200\,000\tan^{-1}\left(\frac{689\,643}{181\,642+\sqrt{508\,601\,283\,613}}\right)}{191\,167} + \frac{200\,000\,\pi\,n}{191\,167} \text{ for integer } n$$

Global minima

$$\min\{0.689643\sin(1.91167\,t) + 0.181642\cos(1.91167\,t)\} = -\frac{\sqrt{508\,601\,283\,613}}{1\,000\,000} \text{ at}$$
$$t = \frac{200\,000\tan^{-1}\left(\frac{689\,643}{181\,642-\sqrt{508\,601\,283\,613}}\right)}{191\,167} + \frac{200\,000\,\pi\,n}{191\,167} \text{ for integer } n$$

Again, from the indefinite integral result

$$\int (0.181642\cos(1.91167\,t) + 0.689643\sin(1.91167\,t))\,dt =$$
$$0.0950174\sin(1.91167\,t) - 0.360754\cos(1.91167\,t) + \text{constant}$$

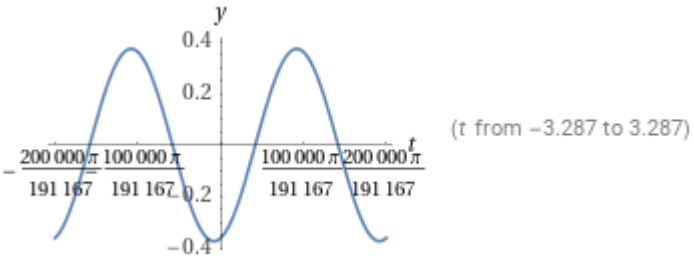
we obtain:

-0.360754 cos(1.91167 t) + 0.0950174 sin(1.91167 t)

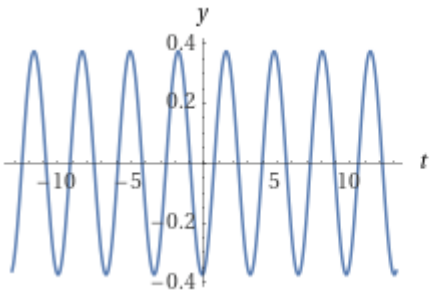
Input interpretation

$$-0.360754\cos(1.91167\,t) + 0.0950174\sin(1.91167\,t)$$

Plots **(figures that can be related to the open strings)**



(t from −3.287 to 3.287)



(t from −13.15 to 13.15)

Alternate forms

$$-0.373057\sin(1.31326 - 1.91167\,t)$$

$$-0.373057\sin(1.91167\,t + 1.82833)$$

$$-0.360754\,(\cos(1.91167\,t) - 0.263386\sin(1.91167\,t))$$

Roots

$$t \approx 0.523103\,(3.14159\,n + 1.31326)\,, \quad n \in \mathbb{Z}$$

$\mathbb{Z}$ is the set of integers

Properties as a real function

Domain

$\mathbb{R}$ (all real numbers)

Range

$$\{y \in \mathbb{R} : \frac{1}{5\,000\,000}\left(475\,087 \sin\left(2 \tan^{-1}\left(\frac{1\,803\,770}{475\,087} - \frac{\sqrt{3\,479\,293\,870\,469}}{475\,087}\right)\right) - 1\,803\,770 \cos\left(2 \tan^{-1}\left(\frac{1\,803\,770}{475\,087} - \frac{\sqrt{3\,479\,293\,870\,469}}{475\,087}\right)\right)\right) \le y \le \frac{1}{5\,000\,000}\left(475\,087 \sin\left(2 \tan^{-1}\left(\frac{1\,803\,770 + \sqrt{3\,479\,293\,870\,469}}{475\,087}\right)\right) - 1\,803\,770 \cos\left(2 \tan^{-1}\left(\frac{1\,803\,770 + \sqrt{3\,479\,293\,870\,469}}{475\,087}\right)\right)\right)\}$$

$\mathbb{R}$ is the set of real numbers

$\tan^{-1}(x)$ is the inverse tangent function

Series expansion at t=0

$$-0.360754 + 0.181642\,t + 0.659185\,t^2 - 0.110635\,t^3 - 0.200748\,t^4 + O\left(t^5\right)$$

(Taylor series)

Derivative

$$\frac{d}{dt}(0.0950174 \sin(1.91167\,t) - 0.360754 \cos(1.91167\,t)) = 0.689643 \sin(1.91167\,t) + 0.181642 \cos(1.91167\,t)$$

Indefinite integral

$$\int \left(-0.360754 \cos(1.91167\, t) + 0.0950174 \sin(1.91167\, t)\right) dt = -0.188711 \sin(1.91167\, t) - 0.0497039 \cos(1.91167\, t) + \text{constant}$$

Global maxima

$$\max\{0.0950174 \sin(1.91167\, t) - 0.360754 \cos(1.91167\, t)\} = \frac{\sqrt{3\,479\,293\,870\,469}}{5\,000\,000}$$

$$\text{at } t = \frac{200\,000 \tan^{-1}\left(\frac{475\,087}{-1\,803\,770+\sqrt{3\,479\,293\,870\,469}}\right)}{191\,167} + \frac{200\,000\,\pi\, n}{191\,167} \quad \text{for integer } n$$

Global minima

$$\min\{0.0950174 \sin(1.91167\, t) - 0.360754 \cos(1.91167\, t)\} = -\frac{\sqrt{3\,479\,293\,870\,469}}{5\,000\,000}$$

$$\text{at } t = -\frac{200\,000 \tan^{-1}\left(\frac{475\,087}{1\,803\,770+\sqrt{3\,479\,293\,870\,469}}\right)}{191\,167} + \frac{200\,000\,\pi\, n}{191\,167} \quad \text{for integer } n$$

From the indefinite integral result

$$\int \left(-0.360754 \cos(1.91167\, t) + 0.0950174 \sin(1.91167\, t)\right) dt = -0.188711 \sin(1.91167\, t) - 0.0497039 \cos(1.91167\, t) + \text{constant}$$

we obtain for t = 1:

-0.0497039 cos(1.91167) - 0.188711 sin(1.91167)

Input interpretation

$$-0.0497039 \cos(1.91167) + \sin(1.91167) \times (-0.188711)$$

Result

$$-0.161236583359211867942586063067576042804072433644388798736824453$$
$$\ldots$$

-0.161236583359….

Alternative representations

$$\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\sin(1.91167) = -0.0497039\cosh(1.91167\,i) - 0.188711\cos\left(-1.91167 + \frac{\pi}{2}\right)$$

$$\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\sin(1.91167) = -0.0497039\cosh(-1.91167\,i) - 0.188711\cos\left(-1.91167 + \frac{\pi}{2}\right)$$

$$\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\sin(1.91167) = -0.0497039\cosh(-1.91167\,i) + 0.188711\cos\left(1.91167 + \frac{\pi}{2}\right)$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations

$$\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\sin(1.91167) = \sum_{k=0}^{\infty}(-1)^k\, e^{1.29595\,k}\left(-\frac{0.0497039}{(2\,k)!} - \frac{0.360753}{(1+2\,k)!}\right)$$

$$\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\sin(1.91167) = \sum_{k=0}^{\infty}(-1)^k\left(-0.377422\,J_{1+2\,k}(1.91167) - \frac{0.0497039\,e^{1.29595\,k}}{(2\,k)!}\right)$$

$$\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\sin(1.91167) = \sum_{k=0}^{\infty}(-1)^k\left(-0.377422\,J_{1+2k}(1.91167) + \frac{0.0497039\left(1.91167 - \frac{\pi}{2}\right)^{1+2k}}{(1+2k)!}\right)$$

$n!$ is the factorial function

$J_n(z)$ is the Bessel function of the first kind

Integral representations

$$\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\sin(1.91167) = -0.0497039 + \int_0^1 (-0.360753\cos(1.91167\,t) + 0.0950175\sin(1.91167\,t))\,dt$$

$$\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\sin(1.91167) = \int_0^1 \left(-0.360753\cos(1.91167\,t) - 0.024852\,(-3.82334+\pi)\sin\left(0 - \frac{1}{2}\pi\,(-1+t) + 1.91167\,t\right)\right)dt$$

$$\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\sin(1.91167) = \int_{-i\infty+\gamma}^{i\infty+\gamma} -\frac{0.024852\,e^{-0.913621/s+s}\,(3.62902+s)\,\sqrt{\pi}}{i\,\pi\,s^{3/2}}\,ds \quad \text{for } \gamma > 0$$

From which:

-10*(-0.0497039 cos(1.91167) - 0.188711 sin(1.91167))

Input interpretation

$$-10\,(-0.0497039\cos(1.91167) + \sin(1.91167)\times(-0.188711))$$

Result

1.612365833592118679425860630675760428040724336443887987368244530 0

…

1.61236583359…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternative representations

$$-10\,(\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\,\sin(1.91167)) = -10\left(-0.0497039\,\cosh(1.91167\,i) - 0.188711\,\cos\left(-1.91167 + \frac{\pi}{2}\right)\right)$$

$$-10\,(\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\,\sin(1.91167)) = -10\left(-0.0497039\,\cosh(-1.91167\,i) - 0.188711\,\cos\left(-1.91167 + \frac{\pi}{2}\right)\right)$$

$$-10\,(\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\,\sin(1.91167)) = -10\left(-0.0497039\,\cosh(-1.91167\,i) + 0.188711\,\cos\left(1.91167 + \frac{\pi}{2}\right)\right)$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations

$$-10\,(\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\,\sin(1.91167)) = \sum_{k=0}^{\infty} (-1)^k\, e^{1.29595\,k} \left(\frac{0.497039}{(2\,k)!} + \frac{3.60753}{(1+2\,k)!}\right)$$

$$-10\,(\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\,\sin(1.91167)) = \sum_{k=0}^{\infty} (-1)^k \left(3.77422\,J_{1+2\,k}(1.91167) + \frac{0.497039\,e^{1.29595\,k}}{(2\,k)!}\right)$$

$$-10\,(\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\,\sin(1.91167)) = \sum_{k=0}^{\infty}(-1)^k\left(3.77422\,J_{1+2k}(1.91167) - \frac{0.497039\left(1.91167 - \frac{\pi}{2}\right)^{1+2k}}{(1+2k)!}\right)$$

$n!$ is the factorial function

$J_n(z)$ is the Bessel function of the first kind

Integral representations

$$-10\,(\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\,\sin(1.91167)) = 0.497039 + \int_0^1 (3.60753\,\cos(1.91167\,t) - 0.950175\,\sin(1.91167\,t))\,dt$$

$$-10\,(\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\,\sin(1.91167)) = \int_0^1 \left(3.60753\,\cos(1.91167\,t) + 0.24852\,(-3.82334 + \pi)\,\sin\left(0 - \frac{1}{2}\pi\,(-1+t) + 1.91167\,t\right)\right)dt$$

$$-10\,(\cos(1.91167)\,(-1)\,0.0497039 - 0.188711\,\sin(1.91167)) = \int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} \frac{0.24852\,e^{-0.913621/s+s}\,(3.62902+s)\,\sqrt{\pi}}{i\,\pi\,s^{3/2}}\,ds \quad \text{for } \gamma > 0$$

August 16, 1906 Valparaiso (Chile) 8.2 Richter 33°03′00.36″S 71°37′00″W

Monday, August 20, 1906 01:27:16 New Moon 26°06'49 384338.75 km

1h 27m 16s

Input interpretation

1 hour 27 minutes 16 seconds

Results

1.454 hours

5236 seconds

5236 seconds = 1.454444444444°

20/08/1906	2.09	Eclisse parziale. Magnitud. = 0,31	Settentrionale	5.22	19.04

Ischia tides:

4h 30m

Input interpretation

4 hours 30 minutes

Results

4.5 hours

270 minutes

Unit conversions

16 200 seconds

16200 seconds = 4.5°

17h 5m

Input interpretation

17 hours 5 minutes

Results

1025 minutes

17.08 hours

Unit conversions

61 500 seconds

61500 seconds = 17.08333333333°

(26° 06' 49" + 1.454444444444°+4.5°)+((2√2)/π)°

Input interpretation

$$\left(26 \text{ degrees} \;\; 6 \text{ arcminutes} \;\; 49 \text{ arcseconds} + 1.454444444444^\circ \text{ (degrees)} + 4.5^\circ \text{ (degrees)}\right) + \frac{2\sqrt{2}}{\pi}^\circ \text{ (degrees)}$$

Results

32 degrees 58 arcminutes

32° 58’

√2*(26° 06' 49" + 1.454444444444°+4.5°+17.08333333333°)

Input interpretation

$\sqrt{2}$ (26 degrees 6 arcminutes 49 arcseconds + 1.454444444444° (degrees) + 4.5° (degrees) + 17.08333333333° (degrees))

Results

70 degrees 30 arcminutes 40 arcseconds

(70 degrees 30 arcminutes 40 arcseconds) + ((2√2)/π)°

Input interpretation

$70 \text{ degrees } 30 \text{ arcminutes } 40 \text{ arcseconds} + \frac{2\sqrt{2}}{\pi}°$ (degrees)

Results

71 degrees 24 arcminutes 41.14 arcseconds

71° 24’

32°58'00.0"S 71°24'00.0"W Concón, Valparaíso, Cile

1906-08-11 09:58 Liguria occidentale Mw 4.41

August 20, 1906 - 18 years 11 days 8 hours 42 minutes

Input interpretation

Monday, August 20, 1906 – 18 years 11 days 8 hours 42 minutes

Result

3:18 pm RMT | Wednesday, August 8, 1888

07/08/1888	19.02	Eclisse parziale. Magnitud. = 0,19	Settentrionale	5.10	19.21

1888-08-04	04:40	Vulcano, Stromboli, Lipari

August 20, 1906 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Monday, August 20, 1906 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Sunday, August 31, 1924

30/08/1924	9.19	Eclisse parziale. Magnitud. = 0,42	Settentrionale	5.33	18.47

1924-08-17 21:40 Monti Iblei (Sicilia) Mw 4.74

From

BULLETTINO DEL VULCANISMO ITALIANO – PERIODICO GEOLOGICO ED ARCHEOLOGICO per l'osservazione e la storia dei fenomeni endogeni nel suolo d'Italia – REDATTO DAL *CAV. PROF. MICHELE STEFANO DE ROSSI* - ANNO IV. ROMA - TIPOGRAFIA DELLA PACE - Piazza della Pace N. 35 – 1877

1874

Venendo a dedicare, come ho promesso, poche parole ai massimi di ciascun periodo, faccio notare come nel Novembre 1874, col quale chiudevasi l'ultimo quadro già pubblicato, vedevasi il terremoto battere di preferenza l'Italia quasi meridionale fra la provincia di Caserta e la Terra di Lavoro. Ivi infatti avvenne il 1° massimo dell'anno meteorico segnato cioè il 6 Decembre 1874. Di questo terremoto diedi ampia ana-

Wednesday 9 December 1874 00:06:16 New Moon 16°47'58 399666.73 km

1875

Nulla dico degli altri massimi minori del 1° semestre di quest'anno, perchè ne feci soggetto di speciale memoria (1). Non posso non ricordare però il massimo sismico del 18 Marzo tanto maestrevolmente analizzato dal Serpieri (2) e che colpì le Marche e la Romagna partendo come l'altro suddetto da un radiante eletto in una frattura assiale del sollevamento appennino. Circa un mese dopo, cioè ai 20 di Aprile, la forza sismica raggiungeva un altro massimo quasi nella medesima regione d'Italia e nel medesimo modo (3). Trascorso un altro mese preciso ai 21 Maggio ecco di nuovo l'azione violenta del terremoto si dispiega eleggendo un altro teatro sempre nell'Appennino. Questa volta furono i monti Sillani dominanti la Spezia e l'Emilia colla continuazione della cresta montuosa fin verso il monte Guerrino, che funzionarono da radiante sismico (4).

Nel seguente mese di Giugno avvicinandosi il complemento del mese dopo l'ultimo massimo sismico del 21 Maggio, ai 17 e 18 ci si presenta un nuovo massimo, che prescelie un nuovo radiante lineare intermontano nella Valle del fiume Nera. Ma il fenomeno singolare che caratterizza il nuovo massimo sta nella lentezza, colla quale la forza sismica percorre la linea assegnatale, impiegando tre giorni intieri a risalire con terremoti successivi il bacino del detto fiume (5).

fino al 4 Novembre. In questa data un terremoto piuttosto forte ed abbastanza esteso colpì la regione dell'appennino Sublacense e Tiburtino, ma ne mancarono tanto le notizie particolareggiate, che non mi fu possibile istituirvi una analisi.

Appunto un mese dopo l'ultimo massimo del 1875 avvenuto ai 4 Novembre, l'Italia fu colpita nel Gargano ed a Napoli dal grande terremoto della notte del 6 Dicembre. Singolarmente interessante sarebbe stata l'analisi particolareggiata di questo terremoto. Intorno al quale dopo raccolte le prime notizie, io conclusi così nel mio Bullettino (1).

Sunday 21 March 1875 23:51:50 Full Moon 00°58'17 398418.84 km

06/04/1875	7.37	Eclisse totale.	Meridionale	5.45	18.40

Tuesday, April 20, 1875 16:30:14 Full Moon 00°10'12 404765.44 km

Thursday, May 20, 1875 08:50:11 Full Moon 28°54'00 406189.04 km

Friday, June 18, 1875 23:56:04 Full Moon 27°15'51 402581.82 km

Saturday, November 6, 1875 09:52:10 First quarter 13°36'11 393975.95 km

Monday, December 6, 1875 01:56:09 First quarter 13°34'57 386072.10 km

rio. Perciò preferisco anche in ciò di attendere, essendo pago di tenere in vista ed in osservazione questa assai probabile speciale forma di alcuni fra i grandi terremoti. Alla metà di Marzo 1876 cominciarono a spesseggiare i terremoti in Italia e verso il 3, 4 e 5 Aprile divennero assai numerosi ed abbastanza forti massime nell'Umbria a Spoleto in precedenza della piccola eruzione vesuviana del 6 Aprile (1). Continuarono poscia le piccole scosse piuttosto frequenti ed il nuovo massimo comparve nell'Umbria ed a Corleone quasi contemporaneamente ai 21 e 22 del medesimo mese.

biennio sismico italiano. Ed è perciò che non mi fermo neppure per poco a considerare il nuovo massimo del 29 e 30 Aprile avvenuto nel Baldo con circa 30 scosse, nè gli altri cominciati ai 22 Maggio e continuati nel 25, 27, 29 dello stesso mese. In una parola si può dire che dal Giugno a tutto Settembre continuò in Italia il massimo sismico con alcuni giorni culminanti e che in generale in questo periodo anche il Vesuvio si mostrò in fase di molta attività. Ma questo periodo

a mio credere propri del luogo d' osservazione. Da tutto ciò io inferiva nei privati discorsi fatti più volte a molte persone, che una attività speciale si veniva manifestando nella regione fra i monti albani e i prenestini e segnatamente nella linea fra i detti monti Albani e Subiaco. Ciò avvenne fino ai 22 Ottobre: nel qual giorno il movimento microsismico divenne assai vibrato e forte relativamente ai giorni precedenti, rimanendo però sempre dentro proporzioni assai limitate e conservando sempre costante la direzione predetta parallela al meridiano. Credetti perciò avvicinarsi il massimo del periodo,

regione già indicata fra Subiaco ed il vulcano laziale. Infatti all' agitazione del 22 subentrò una calma perfetta, che suole essere indizio sicuro, che le forze sismiche si concentrano in un punto d' onde devono irrompere con furia. Ed ecco nel 26 Ottobre alle 3. 30 pom. un fortissimo terremoto agitò appunto la linea preveduta fra Subiaco e i Monti Albani elegendo a

Il ripetersi delle scosse nello stesso giorno 26 e nel seguente 27 mostrava, che l' azione non avea esaurito le sue forze. Ma in questo seguito di manifestazioni sismiche ho no-

come apparisce dalla nota del Papiri. Non così però avveniva nell' Italia meridionale ed in particolare a Corleone in Sicilia. Quivi nel giorno 26 il suolo tremò quasi continuamente in tutto il giorno, coincidendo così il massimo sismico di Corleone con quello di Palestrina. Sembrava difficile ritenere per

25/03/1876	21.06	Eclisse anulare.	Settentrionale	6.05	18.28

Saturday, April 8, 1876 19:39:02 Full Moon 19°18'14 389382.34 km

Monday, April 24, 1876 07:03:36 New Moon 04°25'22 367628.00 km

Sunday, April 30, 1876 22:27:15 First Quarter 10°52'30 373084.38 km

Tuesday, May 23, 1876 15:25:19 New Moon 02°46'36 360510.30 km

Wednesday, October 25, 1876 07:54:45 First Quarter 02°16'01 403900.19 km

Wednesday, November 1, 1876 23:30:58 Full Moon 09°55'02 372821.58 km

March 25, 1876 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Saturday, March 25, 1876 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Thursday, April 5, 1894

06/04/1894	4.55	Eclisse anulare.	Settentrionale	5.45	18.41

Friday 6 April 1894 03:59:58 New Moon 16°20'21 378907.05 km

1894-04-06 12:06	Cuneese

March 25, 1876 - 18 years 11 days 8 hours 42 minutes

Input interpretation

Saturday, March 25, 1876 – 18 years 11 days 8 hours 42 minutes

Result

3:18 pm LMT | Saturday, March 13, 1858

1858-03-07	14	Campania meridionale

Sunday 7 March 1858 18:10:54 Last quarter 16°54'50 404255.10 km

15/03/1858	13.07	Eclisse anulare.	Settentrionale	6.23	18.16

Observations and conclusions

Electromagnetic phenomena accompany periods of earthquakes, and which at that time often take the place of telluric motions. In addition to this, they predominate every year during one or two months which chooses between March and May or, at the latest, enters June and July. **The activity of the sun is the center of electromagnetic phenomena** (Michele Stefano De Rossi – "Meteorologia Endogena")

Recall that tidal force (generally used in the plural, tidal forces or tidal forces, and also with the expression tidal effects) is a secondary effect of the **force of gravity**. Tidal effects from different bodies can add up, as in the case of the alignment between the Moon and the Sun which gives rise to intense syzygial tides.

The undoubted correlation that Prof. De Rossi felt between the Corleone earthquakes and those of Monte Baldo last year moved me to pay special attention to the latter as well. Rummaging through the scientific yearbooks, I found the precise dates of the strongest earthquakes felt in 1866 on the slopes of Monte Baldo, namely: 13 June, 11 August and 7-8 November, which correspond to the new moons; in 1870 seismic activity reawakened there, but I don't know the dates; in 1876 the first strong shock occurred on April 23, that is, on the eve of the new moon; with the perigee (which took place on the 26th) the shocks prepared by the new moon continued until the 29th; then the frequency decreased until May 4th and it already seemed to have left those populations in peace; except that the next coincidence of the new moon with the perigee and with a strong northern declination (in which position, as I already said, one of the two passages to the meridian is an energetic occasion for an earthquake) provided me with such a clue of awakening, probably on a greater extent of land , that here I prepared myself for careful surveillance, so as not to miss the most important phases of the phenomenon, when this happened. I mentioned this probability to Prof. Don Timoteo Bertelli of Florence in my letter of May 1st and to Prof. Goiran of Verona in a letter of the same 12th. The critical day otherwise passed peacefully in Trieste; not so in Monte Baldo, where the tremors resumed on the 22nd and continued on the 23rd, to be repeated on the 29th; at the same time in Corleone the activity, which had seemed almost extinguished since the 10th, was reawakened with a shock on the 20th, one on the 21st, four on the 24th and with great energy on the 25th. On May 22nd, the eve of the new moon, the very strong earthquake also occurred of Spoleto and at the time of the new moon in question there was, it can be said, no region of the Apennines in which seismic activity did not manifest itself with greater or lesser force, as can be seen from the bulletin.

In Monte Baldo there was a truce during June; in July the tremors resumed the day after the full moon and continued thereafter without interruption; in the following months tremors were noted on August 7th, September 5th, October 9th and November 4th, that is, almost always one or two days after the full moon. It is remarkable that on May 22nd and 23rd, while the rest of Italy was shaking, there was a truce in Corleone and then an immediate awakening, and the truce that occurred in the new moons following Monte Baldo in the face of energy is equally significant. manifested itself at the same time as Corleone, where the endogenous forces were transported by geological-mechanical effects, which it is not my task to erudite. In 1870, as far as I can remember, the seismic period of Monte Baldo put an end to that of Monte Nevoso (Julian Alps). This began on February 28th with a strong tremor at 12.20 pm; the next day the shocks were repeated and so also on the day of the new moon, March 2, and the following; after a fifteen-day truce a shock was felt at the full moon; then there were other tremors, the dates of which I could not know; those that came to my attention, and were the strongest, occurred on April 28th (the eve of the new moon), on May 10th, on May 15th (full moon), on June 2nd (near the new moon) and several between the 13th and the 19th. June (full moon period). Then the activity died down there and arose in Monte Baldo. Monte Nevoso was frequently subject to earthquakes; in relatively recent times there was a long period from November 1750 to May 1753; and in 1838 the populations remained in suspense for three months. That local area includes the city of Rijeka; and even in the small earthquakes, which occur here from time to time, I have observed a decided prevalence of syzygies. From this we see that some seismic periods, although limited within very narrow boundaries, can be the effect of a large telluric cause. I took the Corleone period into special consideration, because this is one of the few whose phases have been carefully studied and from which there is a sufficiently large number of shocks to draw positive consequences. There was another seismic period of recent memory and well studied, that of Belluno; the existing relationship between it and the lunar positions has no need of my demonstrations, because the illustrious Falb proved it since he predicted, based on his theories, the return of the phenomenon even during the course of the period itself.

Perhaps all the seismic phenomena that occur in Italy have as their cause, if not direct, at least determining, the action of the stars, but while on the one hand the lack of sufficient observations does not allow very extensive studies, on the other hand the translocation, which often happens, seismic centers distract the attention of investigators so as not to allow them to glimpse the effects of a great common cause in isolated phenomena.

It is desirable that the invitation made repeatedly by Prof. Cav. De Rossi, in order to obtain the greatest possible number of reports on seismic phenomena, must be listened to by those who have the progress of science at heart and that no one abstains from communicating even crude observations of such phenomena, the memory of which without this could be lost to the detriment of science. (**DELL' ATTRAZIONE LUNI- SOLARE IN RELAZIONE COI FENOMENI MAREO – SISMICI** - STUDI DIMOSTRATIVI DI GIULIO GRABLOVITZ – 1877)

In conclusion:

While **the activity of the sun is the center of electromagnetic phenomena,** the tidal force, hence the luni-solar attraction, is a secondary effect of the **force of gravity**. The **aurora borealis**, for example, is a phenomenon visually characterized by luminous bands that take on a wide range of shapes and colours, rapidly changing in time and space, usually red-green-blue in colour, called auroral arcs, caused from the interaction of charged particles (protons and electrons) of solar origin (solar wind) with the terrestrial ionosphere (atmosphere between 100-500 km): these particles excite the atoms of the atmosphere which, subsequently de-energizing, emit light of various lengths 'wave. Solar activity is a source of emission of **electromagnetic waves** and **electrically charged particles**, the luni-solar attraction, is a secondary effect of the **force of gravity**. It is therefore possible to hypothesize a connection, albeit indirect, between these phenomena and "**gravitational waves**" which, among other things, travel at a speed equal to c (speed of light), as well as **electromagnetic waves**. Thus, there is a purely mathematical connection between seismic waves and gravitational waves.

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

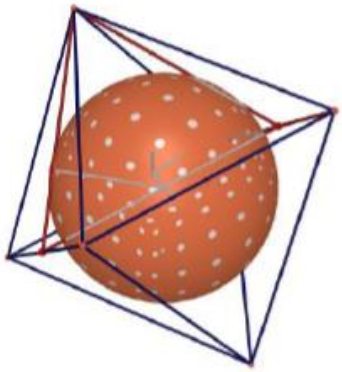


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\ l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2=\frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2=\frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.141939571526584308924330732196162632677513386811659044682541739 3

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

$4096 = 64^2$, (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$).

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.61805\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^8\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^8\right)^k}{k!}\right)\quad\text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$
$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi e^{0} \approx 3.1416$ (real, principal root)

$\pi e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1\sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003$ (real, principal root)

$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003$ (real root)

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\,\pi\left\lfloor\frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{8}{\pi^2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} = \sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\;\sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} = \sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\mathrm{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13

…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\Big/\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}(C\times \mathrm{R}\times 2.33\cdot 10^{-13})}} \cong 1.61803398\ldots = \frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.618035912348264235440174408834709854254527350840173356306481810 7…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\, x^2\, y\, z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$ is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.6018401361\times 10^{-24}\right)}}$$

1.618032997307532491506757016629746746422577260892967140791939590 3
…

1.6180329973075…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.4525642121\times 10^{-24}\right)}}$$

Result

1.644932352102092130483898983704151168876621841655166877914166033 8
…

1.64493235210209213…. ≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

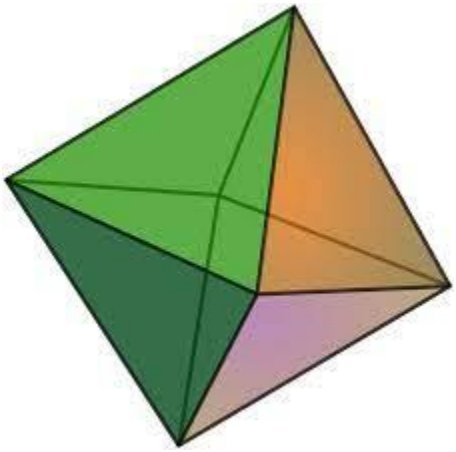
Result

3.14159225731469939939950039231605796469731171781644423955790024797

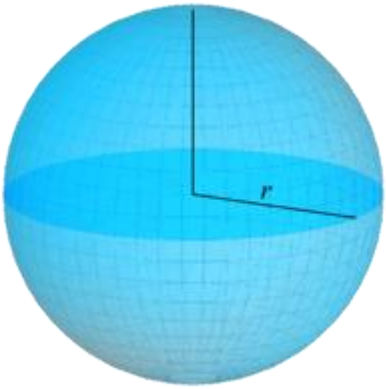
…

3.14159225731469…. ≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find *a*, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

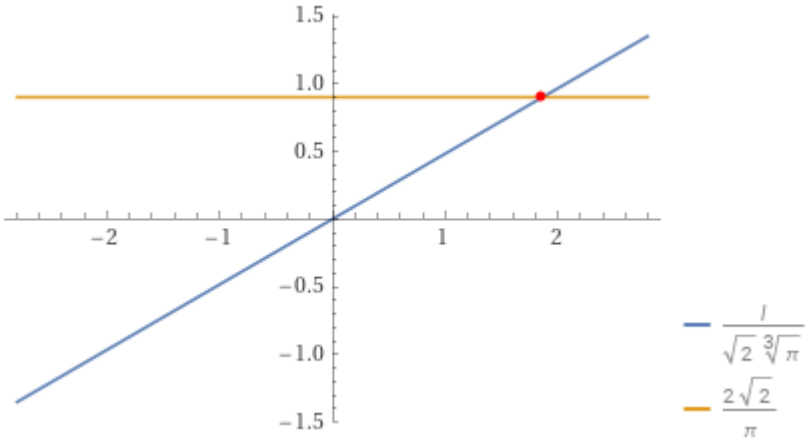
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,3}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

1.64381856858…. $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\wedge(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-\right.\right.\right.\right.$$
$$\left.\left.\left.\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\right/\right.\right.$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\text{^}(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-\right.\right.\right.\right.$$
$$\left.\left.\left.\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\right/\right.\right.$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\text{^}(1/15)\right)$$
for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\operatorname{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

$-5.010882647757...$

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+...}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\,\sqrt{6}}\right)^2\right\} = 0$$

$$\text{for } b = -\frac{226\,802\,245}{18\,480\,874}$$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

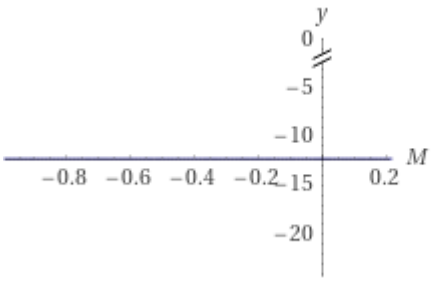
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

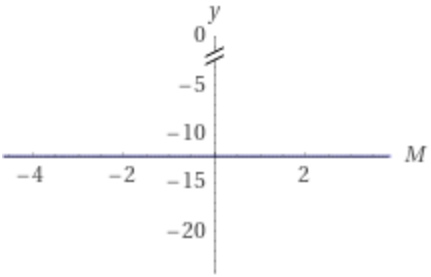
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V = \frac{1}{3}(0.0814845\,b + 1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

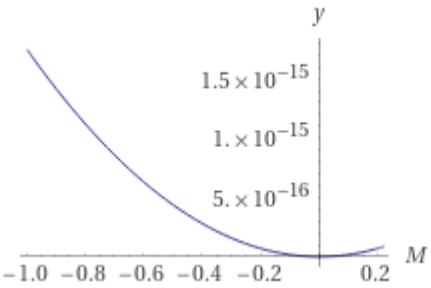
Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

Result:

0

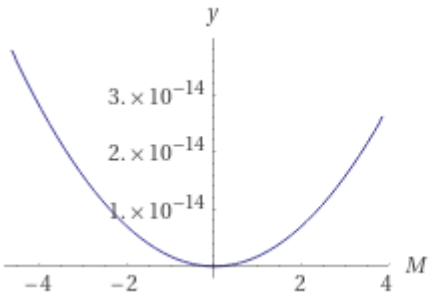
Plots: **(possible mathematical connection with an open string)**



(M from −1 to 0.2)

M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O(M^{62194})$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^\infty \left(\frac{1}{3} M^2 \left(1 + \frac{18.4084 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4} \right)}{M^2} \right)^2 - 1.75541 \times 10^{-15}\, M^2 \right) dM = 0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3} \left(0.0814845 \times \frac{225.913 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4} \right)}{M^2} + 1 \right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3} \left(0.0814845 \times \frac{225.913 \left(-0.054323\, (-0.5)^2 + 6.58545 \times 10^{-10} \sqrt{(-0.5)^4} \right)}{(-0.5)^2} + 1 \right)^2 \left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots \times 10^{-16}$$

-4.38851344947*10^{-16}

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times 10^{-17}$

7.021621519159*10^{-17}

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

1.57986484181*10^-14

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 2^2 + 6.58545 \times 10^{-10}\sqrt{2^4}\right)}{2^2} + 1\right)^2 \times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

7.021621519*10^-15

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_{0}}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\,\hat{}\,(1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

5.729475 * 10^{-35} Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

1.820306 * 10^{61} V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

5.975498*10^{-8} V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

1.042940*10^{27} V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

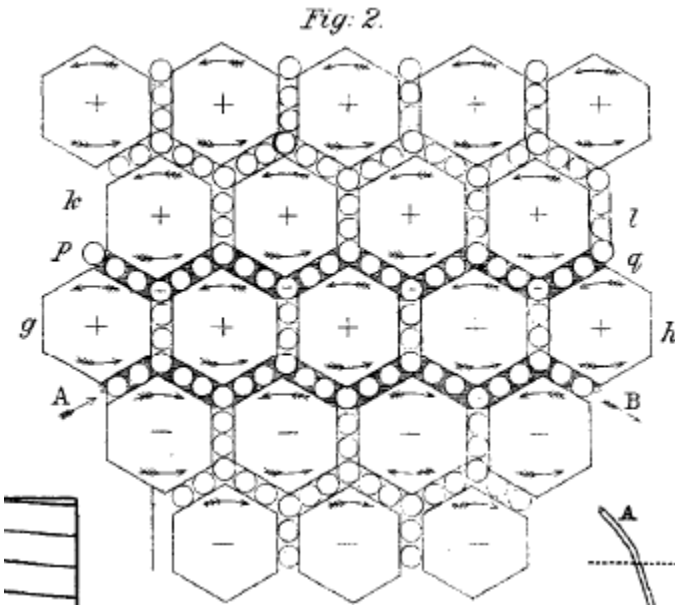
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

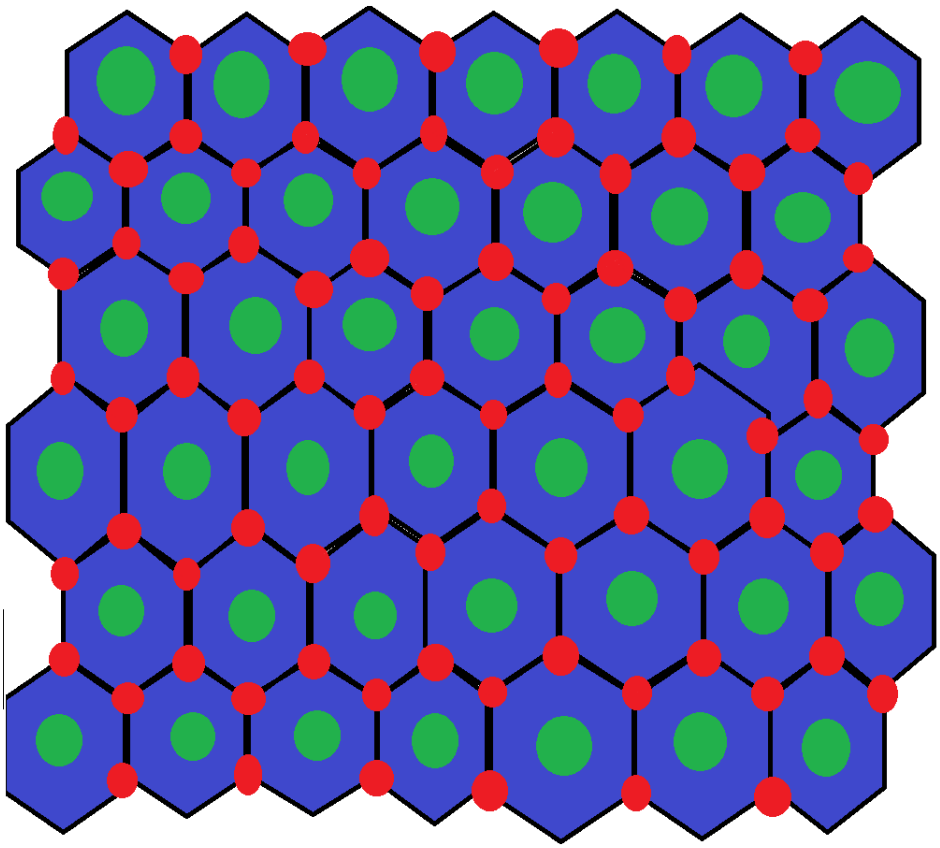
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On the study of various earthquakes, geophysical phenomena and related equations. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory II

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper, (part II) we analyze various earthquakes, geophysical phenomena and related equations. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory

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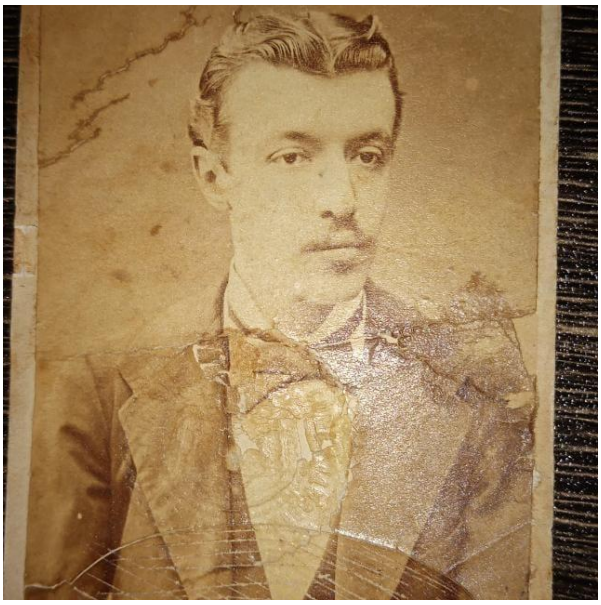
A. Nardelli studied at the Università degli Studi di Napoli Federico II - Dipartimento di Studi Umanistici – **Sezione Filosofia - scholar of Theoretical Philosophy**

Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

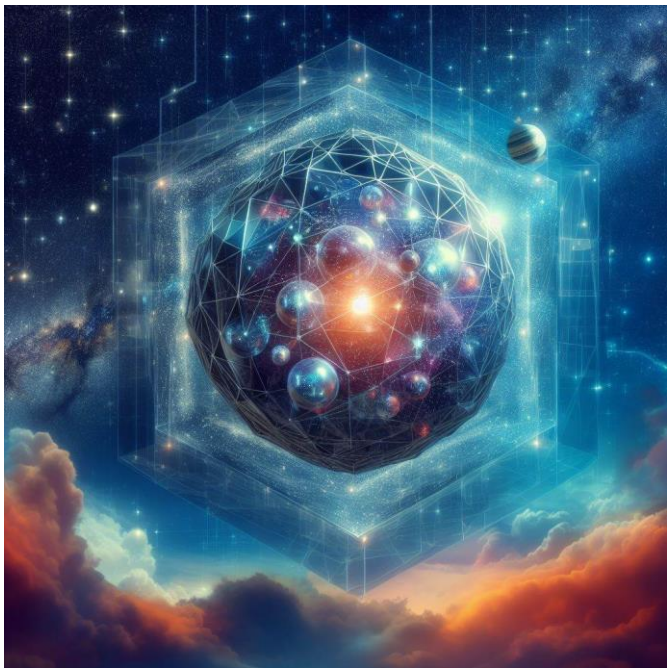
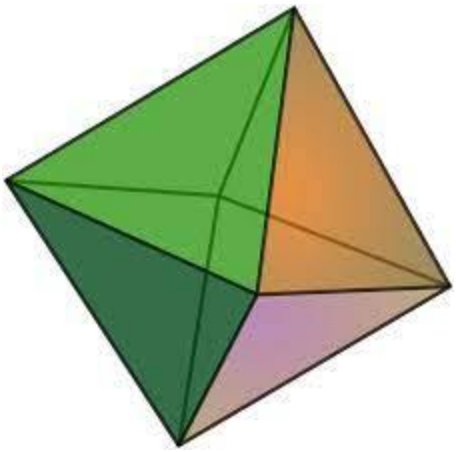
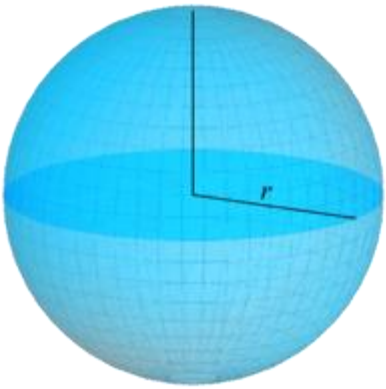


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\,\pi\,x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$$l = 0\,, \quad x = 0$$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi\,x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi\,x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

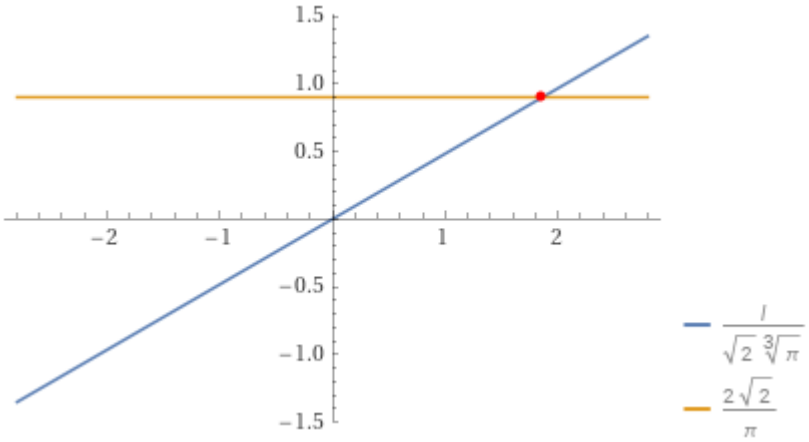
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

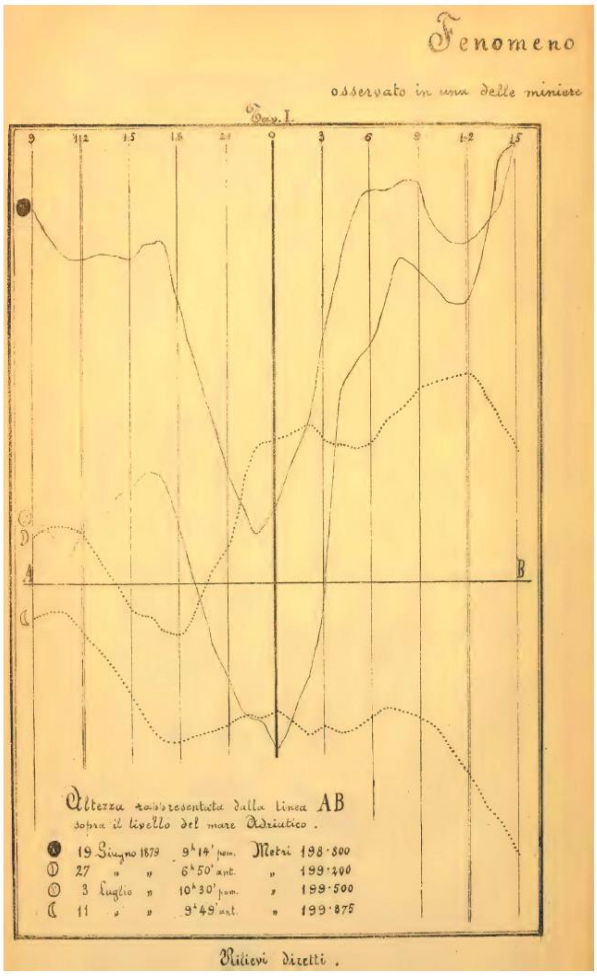
Plot

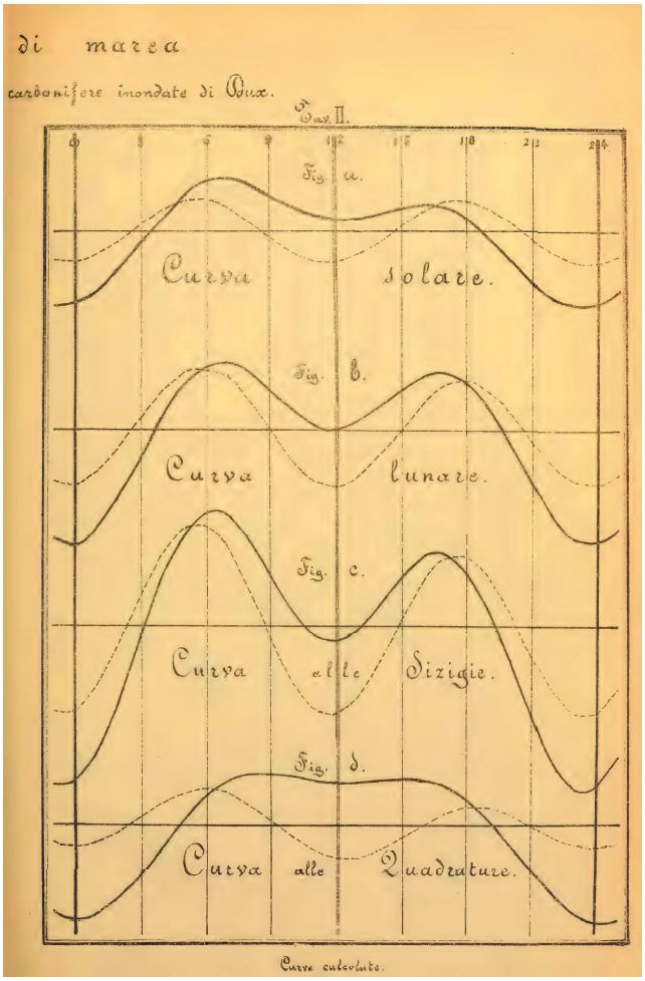


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

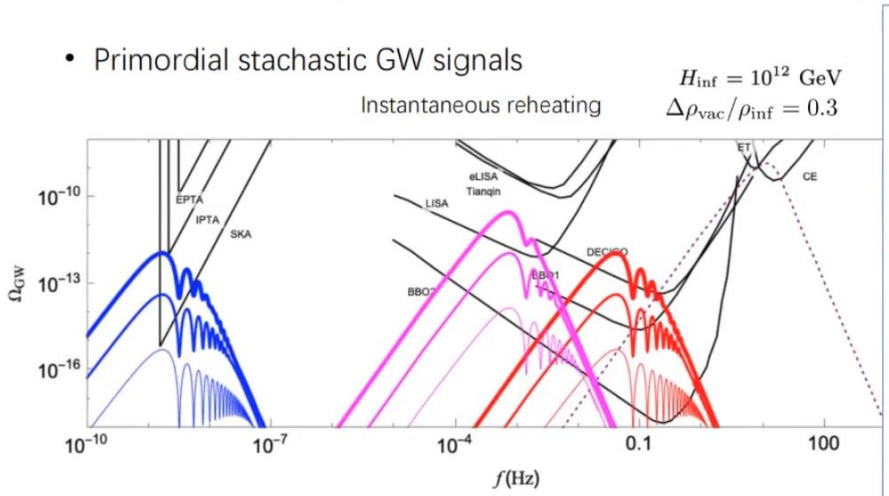

di marea
carbonifere inondate di Pux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

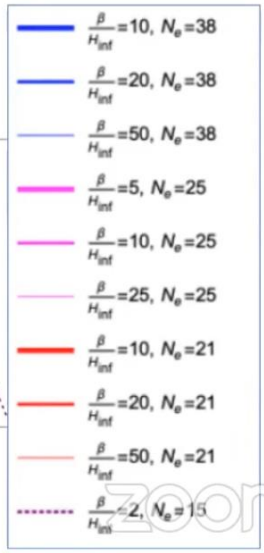
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

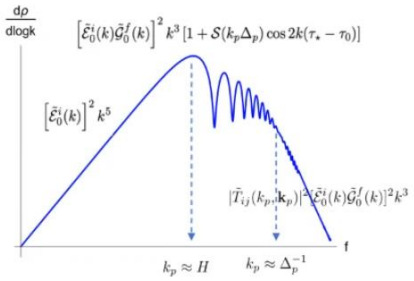
Comparison between primary GW and secondary GW

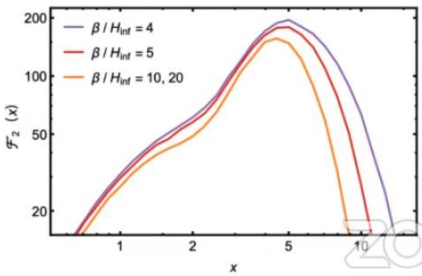
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





From:

SULLE SORGIVE TERMALI DEL PORTO D'ISCHIA

Di Giulio Grablovitz

Nei primi tre mesi del corrente anno 1887 le acque termominerali che sgorgano presso al mare, spesse volte scemarono di portata e temperatura e due volte mancarono affatto per un periodo di parecchi giorni. Pel solo fatto che questi periodi ebbero principio in coincidenza, la prima volta coi terremoti degli Abruzzi, e la seconda con quelli della Liguria, il fenomeno richiamava un'attenzione particolare.

La sorgiva a cui dirigo le osservazioni giornaliere meridiane della temperatura, è quella dello Stabilimento balneo-militare. Una sola volta m'era accaduto in addietro di vedere sterile questa sorgiva e ciò avvenne nella prima settimana dell'aprile 1886: fu allora infatti che diedi principio alle osservazioni giornaliere, perchè reputai il fatto degno d'attenzione, quantunque paresse giustificato, secondo i risultati d'osservazioni fatte altrove, dall'anticiclone barometrico che allora dominava al Nord.

Dopo quel fatto le acque non subirono più alcuna sospensione, nè alcuna rilevante diminuzione di temperatura nei periodi d'osservazione, sino verso la fine del gennaio decorso; anzi il fenomeno ebbe apparenze tanto normali, che ne feci cenno in apposita relazione presentata alla Commissione reale geodinamica, accentuando specialmente le relazioni che si rivelavano tra le variazioni idrotermiche e quelle del barometro.

Al 25 gennaio m'avvidi che la portata s'era improvvisamente indebolita e la temperatura era diminuita di 2° nelle 24 ore; tenni d'occhio il fenomeno pure ad altre ore ed osservai che il decremento continuava rapidamente, in modo che il 26 la corrente era quasi nulla e nel mattino del 27 era del tutto cessata; in pari tempo la temperatura dell'acqua rimasta stagnante nel bacino diminuiva in modo da ridursi il 31 a 28°. L'acqua ricomparve con debole corrente, salendo a 34° il 3 febbraio, ma il giorno appresso rimase di nuovo sospesa e la temperatura si ridusse il 5 a 24° 2; nel giorno 9 la corrente riprese improvvisamente il suo aspetto ordinario e la temperatura salì tosto a 46° 2, per varcare il giorno appresso i 50° ossia rimettersi entro i limiti ordinari.

Ugualmente dal 23 al 24 febbraio incominciò un nuovo periodo di siccità con un abbassamento di 2° 5 nelle 24 ore; la corrente da debole divenne debolissima ed al 1° marzo mancò del tutto e la temperatura scese pel naturale raffreddamento dovuto al ristagno a 22° 2. Nel mattino del 6 marzo l'acqua termale ricomparve in tutte le sorgive del porto, ma la temperatura andò questa volta salendo gradatamente col lento accrescersi della portata, per raggiungere appena al 13 marzo i 50°.

Da allora in poi soltanto al 28 marzo si manifestò un rallentamento della corrente con una diminuzione di 1° 4, ma non ebbe seguito.

Mentre di questi fenomeni, e specialmente di quelli avvenuti in contemporaneità ai terremoti liguri, diedi notizia senza apprezzamenti all'Ufficio centrale di meteorologia, mi proposi di sottoporli ad una rigida critica, tanto più che qui il suolo rimase del tutto indifferente alle commozioni d'altrove.

Serie	Numero dei valori	Barometro	Mare	Termale
Gennaio	28	mm. 9.6	cm. 69.5	53°.4
Febbraio.	28	» 5.5	» 63.5	119°.9
Marzo	28	» 6.7	» 111.0	131°.2
Somme	84	» 21.8	» 244.0	304°.5

Le somme delle differenze barometriche sono poste per rendere completo il quadro, ma come era da prevedersi sono inconcludenti, limitandosi la media differenza a piccola frazione di millimetro.

Sea → 69.5 = Thermal → 53.4°

Sea → 63.5 = Thermal → 119.9°

Sea → 111 = Thermal → 131.2°

244 cm = 304.5°

We observe that:

1+1/((304.5/244)^2)

Input

$$1 + \frac{1}{\left(\frac{304.5}{244}\right)^2}$$

Result

1.642103531860623758024811192808474955578743586217681682264661710 8

…

1.64210353186…. ≈ $\zeta(2) = \pi^2/6 = 1.644934$ (trace of the instanton shape and Ramanujan Recurring Number)

Eclipse of 1887

22/02/1887	22.36	Eclisse anulare.	Meridionale	6.57	17.51
19/08/1887	6.27	Eclisse totale.	Settentrionale	5.21	19.05

Earthquakes February-March 1887

1887-01-27	02:45	Aquilano
1887-01-31	06	Stromboli
1887-02-23	05:21	Liguria occidentale
1887-02-23	05:29	Liguria occidentale
1887-02-23	07:51	Liguria occidentale
1887-02-24	01:50	Riviera italo-francese
1887-03-03	02	Cuneese
1887-03-11	14:45	Liguria occidentale
1887-03-29	08:58	Valle del Brenta
1887-03-30	01:10	Marostica
1887-03-30	03	Marostica
1887-03-31	03	Filicudi

https://storing.ingv.it/cfti/cfti5/pdf_T/000829-280019_T.pdf

The most intense and strongest, in western Liguria, was that of March 11, which spread throughout Liguria and Piedmont, and had an echo also in Abruzzo in Aquila, and in Sicily in Mineo. In the mountains, which surround the Ligurian gulf, the great shaking of the ground was followed by continuous trepidations more or less strong, which continued for a large part of the month of March and also in April; in which month the seismic shaking had notably diminished

The event of March 11, spread throughout Liguria and Piedmont, and had an echo also in Abruzzo in Aquila, and in Sicily in Mineo.

So: February 23rd and March 11th

February 22, 1887	21:40:22	New Moon	03°59'28	405 278.97 km
March 9, 1887	20:33:54	Full Moon	18°58'45	356 770.67 km

Separando le differenze dei dati primitivi in eccesso del livello del mare da quelle in difetto (—) e sommando col proprio segno le differenze dei dati primitivi della termale ad esse corrispondenti, si ottiene il seguente risultato:

	Mare	Termale	Rapporto $= \frac{T}{M}$
Gennaio	+ 37.0	+ 26.5	+ 0.716
	— 32.5	— 23.9	+ 0.735
Febbraio	+ 32.5	+ 34.0	+ 1.046
	— 31.0	— 41.5	+ 1.349
Marzo	+ 56.5	+ 59.4	+ 1.051
	— 54.5	— 55.9	+ 1.026
Somme + = Σ. .	+ 126.0	+ 119.9	+ 0.952
» — = σ. .	— 118 0	— 121.8	+ 1.028
Σ — σ.	+ 244.0	+ 241.2	+ 0.989

il che significa che la temperatura della termale aumenta o diminuisce, col crescere o decrescere del livello del mare, in ragione di 0^0 989 per centimetro. Questo risultato ha per ora un significato puramente rappresentativo; si vedrà poi quale sia il suo valore effettivo.

February → Sea +32.5 ; Thermal +34

March → Sea +56.5; Thermal +59.4

Ratio T/M = 34/32.5 = 1,04615384615…

T/M = 59.4/56.5 = 1,05132743362831…

We have also:

(34/32.5)^11

Input

$$\left(\frac{34}{32.5}\right)^{11}$$

Result

1.64267299180307569206924801586338249555862846931340607822594475 60

…

1.642672991803075692…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

(59.4/56.5)^10

Input

$\left(\frac{59.4}{56.5}\right)^{10}$

Result

1.64960502779295380162488862272292934479931172835625386098066705 72

…

1.649605027792…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And from the mean:

(((34/32.5)^11 + (59.4/56.5)^10))/2

Input

$\frac{1}{2}\left(\left(\frac{34}{32.5}\right)^{11}+\left(\frac{59.4}{56.5}\right)^{10}\right)$

Result

1.64613900979801474684706831929315592017897009883482996960330590 66

…

1.646139009798…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Considering also the previous value, we have:

(1+1/((304.5/244)^2) + (((34/32.5)^11 + (59.4/56.5)^10)))/3

Input

$$\frac{1}{3}\left(1+\frac{1}{\left(\frac{304.5}{244}\right)^2}+\left(\left(\frac{34}{32.5}\right)^{11}+\left(\frac{59.4}{56.5}\right)^{10}\right)\right)$$

Result

1.644793850485551083906315943798262265312227927962447207157091174 7

…

1.644793850485…. ≈ $\zeta(2) = \pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

il che significa che la temperatura della termale aumenta o diminuisce, col crescere o decrescere del livello del mare, in ragione di 0° 989 per centimetro. Questo risultato ha per ora un significato puramente rappresentativo; si vedrà poi quale sia il suo valore effettivo.

22/02/1887	22.36	Eclisse anulare.	Meridionale	6.57	17.51

Let's add to this date 3 Saros Cycles:

February 22, 1887 + 54 years 34 days 2 hours 6 minutes

Input interpretation

Tuesday, February 22, 1887 + 54 years 34 days 2 hours 6 minutes

Result

2:06 am CEST | Friday, March 28, 1941

We note that:

27/03/1941	21.12	Eclisse anulare.	Meridionale	6.02	18.29

And also:

1941-03-10 08 Sellano

1941-03-16 16:35 Tirreno meridionale Mw = 5.91

1941-03-27 05:20 Etna - Fleri (Zafferana E.) Mw = 3.47

13 March 1941 11:46:43 Full Moon 22°30'59 361 904.77 km

27 March 1941 20:13:42 New Moon 06°46'07 403 865.46 km

Let's move on by adding 6 Saros Cycles to the date of the eclipse

February 22, 1887 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Tuesday, February 22, 1887 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Monday, May 1, 1995

We note that in the month of May 1995, the following seismic events occurred:

1995-05-13	10:16	Adriatico centrale
1995-05-13	18:55	Puglia meridionale
1995-05-15	14:17	Tirreno meridionale
1995-05-22	11:16	Carniola interna (Nord-est Iralia)
1995-05-22	12:50	Carniola interna
1995-05-29	06:52	Isole Egadi (ovest Sicilia)
1995-05-29	20:44	Val d'Agri (Calabria)

May 14, 1995 20:48:07 Full Moon 23°35'20 358 600.80 km

May 21, 1995 11:35:40 Last quarter 29°57'39 380 655.42 km

May 29, 1995 09:27:07 New Moon 07°33'43 406 220.71 km

Let's now go back two Saros Cycles:

February 22, 1887 - 36 years 22 days 17 hours 24 minutes

Input interpretation

Tuesday, February 22, 1887 – 36 years 22 days 17 hours 24 minutes

Result

6:36 am LMT | Thursday, January 30, 1851

We note that:

01/02/1851	6.57	Eclisse anulare.	Meridionale	7.24	17.25

Even a few days after that date, the following earthquakes occurred:

1851-02-05 09:50	Valtellina	Mw = 4.72
1851-02-06	Lugano	
1851-02-15 17	Catanzaro	Mw = 4.16

1 February 1851 06:01:59 New Moon 11°50'40 405 918.16 km

16 February 1851 03:28:42 Full Moon 26°54'50 356 618.02 km

Now let's go back 3 Saros cycles:

February. 22 1887 - 54 years 34 days 2 hours 6 minutes

Input interpretation

Tuesday, February 22, 1887 – 54 years 34 days 2 hours 6 minutes

Result

9:54 pm LMT | Friday, January 18, 1833

We note that:

20/01/1833	23.00	Eclisse anulare.	Meridionale	7.33	17.10

And also:

1833-01-11	Ljubljana	Mw = 4.16
1833-01-19 03:15	Albania	
1833-01-19 03:55	Albania meridionale	
1833-01-19 10	Albania-Salento	

12 January 1833 23:36:16 Last quarter 22°37'20 380815.40 km

20 January 1833 22:04:37 New Moon 00°42'13 406150.76 km

And again, subtracting one Saros Cycle from this last eclipse:

January. 20 1833 - 18 years 11 days 8 hours 42 minutes

Input interpretation

Sunday, January 20, 1833 – 18 years 11 days 8 hours 42 minutes

Result

3:18 pm LMT | Sunday, January 8, 1815

We note that:

10/01/1815	14.59	Eclisse anulare.	Meridionale	7.38	16.58

And also:

1815-01-08 10:10 Siena

1815-01-11 23:30 Monte Amiata Mw = 4.86

10 January 1815 14:04:48 New Moon 19°32'36 406330.03 km

Fisica terrestre. — *Sul mareografo d'Ischia.* Nota di G. GRABLOVITZ, presentata dal Corrispondente TACCHINI.

« Col novilunio del 12 dicembre 1890 si sono compiute dodici lunazioni dall'impianto del mareografo nel porto d'Ischia.

Tides

« Nel quadro che segue sono distinti gli effetti solari e lunari, quali risultano dalle singole lunazioni complete. Le due prime colonne indicano le date estreme delle lunazioni; la terza indica la semi-ampiezza in millimetri dell'oscillazione solare e la quarta l'istante del rispettivo massimo in tempo vero solare; la quinta la semi-ampiezza dell'oscillazione lunare e la sesta l'istante del rispettivo massimo espresso dall'angolo orario lunare contato dal meridiano superiore verso occidente.

Lunazione				Sole		Luna	
dal		al		Semi-ampiezza	Istante	Semi-ampiezza	Istante
22 dicembre	1889	20 gennaio	1890	36.9	9^h23^m0	123.9	8^h36^m9
21 gennaio	1890	18 febbraio	»	46.7	9 47.2	127.1	8 37.3
19 febbraio	»	19 marzo	»	56.9	9 36.8	127.7	8 41.9
20 marzo	»	18 aprile	»	62.5	9 16.3	130.1	8 44.6
19 aprile	»	17 maggio	»	48.9	9 11.0	121.6	8 45.9
18 maggio	»	16 giugno	»	37.6	9 8.5	120.2	8 53.6
17 giugno	»	16 luglio	»	32.1	9 24.3	119.3	8 47.9
17 luglio	»	13 agosto	»	39.8	9 53.4	116.7	8 44.5
14 agosto	»	13 settembre	»	49.7	9 44.7	121.4	8 49.0
14 settembre	»	13 ottobre	»	58.2	9 33.9	117.1	8 59.6
14 ottobre	»	12 novembre	»	51.3	9 9.2	115.9	8 54.7
13 novembre	»	11 dicembre	»	40.2	8 49.0	118.0	8 36.1
22 dicembre	1889	11 dicembre	1890	46.7	9^h24^m8	121.6	8^h46^m0

21 gennaio 1890 | 18 febbraio » | 46.7 | 9 47.2 | 127.1 | 8 37.3

1890-01-21	20:07	Zweisimmen (Svizzera)
1890-01-22		Sabina (Umbria, Lazio, Abruzzo)
1890-02-11	06:38	Lipari (Arcipelago Eolie)
1890-02-15	02:35	Valdelsa (Toscana)

January 20, 1890 23:49:06 New Moon 00°56'53 357164.53 km

February 12, 1890 18:51:27 Last quarter 24°03'52 377242.25 km

February 19, 1890 10:27:45 New Moon 00°46'35 361605.24 km

20 marzo	»	18 aprile	»	62.5	9 16.3	130.1	8 44.6

1890-03-26 20:10	Bellunese (Veneto)

Thursday, March 20, 1890 21:01:29 New Moon 00°13'15 369953.27 km

Friday, March 28, 1890 09:32:37 First Quarter 07°40'11 403011.05 km

19 aprile	»	17 maggio	»	48.9	9 11.0	121.6	8 45.9
18 maggio	»	16 giugno	»	37.6	9 8.5	120.2	8 53.6

1890-05-04 12:09	Valdelsa (Toscana)
1890-05-25	Isola di Pantelleria (Sicilia)

May 4, 1890 21:08:58 Full Moon 14°18'45 375652.79 km

May 26, 1890 22:33:50 First Quarter 05°33'55 401195.77 km

June 3, 1890 06:34:12 Full Moon 12°35'26 366179.68 km

17/06/1890	10.58	Eclisse anulare.	Settentrionale	4.34	19.47

14 settembre	»	13 ottobre	»	58.2	9	33.9	117.1	8	59.6

1890-09-16 01:48 Riviera di Ponente (Riviera Ligure)

14 September 1890 07:52:57 New Moon 21°25'36 401694.90 km

ECLISSE SOLARE DEL 6 GIUGNO 1891

Nota di **GIULIO GRABLOVITZ.**

L'eclisse del Sole che avverrà nel pomeriggio del 6 giugno 1891 sarà anulare su una breve linea al NE dell'Asia e dell'adiacente mare polare. Sarà visibile come eclisse parziale nella parte superiore dell'America settentrionale, sulle coste settentrionali asiatiche e nell'Europa settentrionale ed occidentale.

Insieme a queste notizie sommarie, riproduco pure dal *Nautical Almanac* le fasi principali per la terra presa in generale, in tempo medio ridotto al meridiano di Roma (Collegio Romano), cioè:

Principio	dell'eclisse	parziale.	2^h	53^m	3^s	pom.
Id.	id.	centrale	4	42	2	»
Fine	id.	id.	5	29	0	»
Fine	id.	parziale	7	17	9	»

In quest'eclisse l'Italia si trova presso al limite della visibilità e per di più il Sole è prossimo a coricarsi all'ora dell'eclisse, per modo che nella parte meridionale, e precisamente nelle provincie situate al SE d'una curva passante per Foggia, Salerno, Cefalù e Licata, il Sole tramonterà prima dell'uscita della Luna.

Ecco le linee su cui l'eclisse incomincierà alle ore rispettivamente indicate, in tempo medio di Roma, cioè:

A 6^h 5^m pom. Riva (Trentino) - Parenzo (Istria) - Veglia (Quarnero);
» 6 10 » Torino - Novi - Ancona;
» 6 15 » Nizza - Piombino - Foggia - Brindisi;
» 6 20 » Ajaccio (Corsica) - Rossano (Calabria);
» 6 25 » Sassari - Gioia (Calabria);
» 6 30 » Oristano - Palermo - Catania;
» 6 34 » Porto Vesme (Sardegna) - Girgenti.

Terminerà nei seguenti istanti sulle linee indicate appresso, cioè:

A 7^h 10^m pom. Bosa (Sardegna) - Trapani;
» 7 15 » Porto Maurizio - Ponza (isola) - Cosenza;
» 7 16 » Asse della penisola;
» 7 17 » Mare Adriatico.

Tunisi e le coste adiacenti si trovano all'estremo limite della visibilità; il diametro solare apparirà eclissato per 1/10 su di una linea attraversante lo stretto di San Bonifacio e l'estremità della Calabria (presso Palmi); la fase massima raggiungerà 2/10 sulla linea Lecco-Comacchio-Lesina (Dalmazia).

Con questi dati è facile costruire un grafico generale o parziale, allo scopo di rilevare a stima, coll'approssimazione del minuto primo ed anche meno, l'ora del principio e della fine per una qualsivoglia località, ed entro il centesimo di diametro la fase massima; tuttavia do un quadro calcolato per gli Osservatori meteorici che figurano nell'elenco del calendario dell'Osservatorio del Collegio Romano, nonchè per qualche altra località inclusa nella regione a cui s'estende il calcolo.

Per chi poi avesse vaghezza di calcolare con maggiore scrupolo le fasi dell'eclisse ho costruito alcune formole, che per quasi tutta l'Italia riescono esatte entro il decimo di minuto primo; il maggiore errore emerge per l'estremo sud, ossia per l'isola di Sicilia.

Dati dunque

L = Latitudine geografica in gradi e frazioni diminuita di 42°,
l = Longitudine, come sopra, del Collegio Romano (Est +, Ovest —).

si ottiene:

1) l'istante di mezzo

$$\begin{aligned} H = 6^h\,45^m\,92 &- 1^m\,304\ L \\ &- 0\ 0122\ L^2 \\ &- 0\ 264\ l \\ &- 0\ 0112\ l^2 \\ &+ 0\ 0180\ L\,l \end{aligned}$$

2) la semi-durata

$$\begin{aligned} d = \pm \sqrt{886^m\,54 &+ 126^m\,44\ L} \\ &- 1\ 65\ L^2 \\ &+ 44\ 01\ l \\ &- 0\ 80\ l^2 \\ &- 3\ 45\ L\,l \end{aligned}$$

3) la massima fase in parti di diametro solare

$$\begin{aligned} M = 0.\,1149 &+ 0.\,02123\ L \\ &- 0.\,000153\ L^2 \\ &+ 0.\,00937\ l \\ &+ 0.\,000007\ l^2 \\ &- 0.\,000130\ L\,l \end{aligned}$$

L'istante di mezzo si approssima molto a quello della massima fase e può adottarsi per tale; il principio e la fine si ottengono ponendo:

$$P = H - d$$
$$F = H + d$$

Ecco qualche esempio schematico:

ISCHIA (isola)

$$L = 40^\circ\ 44' - 42^\circ = -\ 1.26$$
$$l = \ 1^\circ\ 25'\ \text{Est} = +\ 1.42$$
$$L^2 = +\ 1.59$$
$$l^2 = +\ 2.02$$
$$L\,l = -\ 1.79$$

	H	d^2	M
Valori costanti =	$6^h\ 45^m\ 92$	886.54	0.1449
$-\ 1.26 \times \ldots$	$(-\ 1.304) = +\ 1\ \ 64$	$(+\ 126.44) = -\ 159.31$	$(+\ 0.02123) -\ 0.0267$
$+\ 1.59 \times \ldots$	$(-\ 0.0122) = -\ 0\ \ 02$	$(-\ \ 1.65) = -\ \ 2.62$	$(-\ 0.000153) -\ 0.0002$
$+\ 1.42 \times \ldots$	$(-\ 0.264) = -\ 0\ \ 37$	$(+\ \ 44.01) = +\ \ 62.49$	$(+\ 0.00937) +\ 0.0133$
$+\ 2.02 \times \ldots$	$(-\ 0.0112) = -\ 0\ \ 02$	$(-\ \ 0.80) = -\ \ 1.62$	$(+\ 0.000007) +\ 0.0$
$+\ 1.79 \times \ldots$	$(+\ 0.0180) = -\ 0\ \ 03$	$(-\ \ 3.45) = +\ \ 6.17$	$(-\ 0.000130) +\ 0.0002$
	$H = 6^h\ 47^m\ 12$	$d^2 = 791.65$	$M = 0.1315$

dunque

$$\frac{P}{F} = 6^h\ 47^m\ 12 \mp \sqrt{791.65};$$

ossia

$$P = 6^h\ 47^m\ 12 - 28^m\ 14 = 6^h\ 18^m\ 98$$
$$F = 6\ \ 47\ \ 12 + 28\ \ 14 = 7\ \ 15\ \ 26$$
$$M = 0.\ 1315$$

ROMA (Collegio Romano)

$$L = 41^\circ\ 54' - 42^\circ = -\ 0\ \ 1$$
$$l = -\ 0^\circ\ \ 0' - l^2 = L\,l$$
$$L^2 = \ 0.\ 01 \text{ (trascurabile)}$$
$$H = 6^h\ \ 45^m\ 92 + \ 0^m\ 13 \qquad = 6^h\ \ 46^m\ 05$$
$$d^2 = \ \ 886\ \ 54 - 12\ \ 64 - 0^m\ 01 = \ \ 873\ \ 89$$
$$d = \mp \sqrt{873.89} \qquad = \mp\ 29\ \ 56$$
$$P = 6^h\ \ 16\ \ 44$$
$$F = 7\ \ 15\ \ 61$$
$$M = 0.\ 1449 - 0.\ 0021 = 0.\ 1428$$

I calcoli accuratissimi del prof. E. Millosewich pel punto stesso di Roma danno:

$$P = 6^h\ 16^m\ 41$$
$$F = 7\ \ 15\ \ 58$$
$$M = 0.\ 143$$

e l'accordo non lascia quasi nulla a desiderare.

Per Ischia e per qualsiasi punto entro un raggio di circa 200 chilometri da Roma, basterebbe tener conto dei tre termini primari, senza cadere in errori di qualche conto; per Roma l'errore non affetta nemmeno l'ultima delle cifre tenute a calcolo.

Ischia, 12 maggio 1891.

06/06/1891	17.18	Eclisse anulare.	Settentrionale	4.35	19.42
01/12/1891	12.29	Eclisse parziale. Magnitud. = 0,53	Meridionale	7.18	16.40

1891-06-07 01:06 Valle d'Illasi Mw = 5.87

1891-12-08 Alta Valtiberina Mw = 4.34

June 6, 1891 16:26:16 New Moon 15°37'52 381044.66 km

December 1, 1891 11:45:04 New Moon 09°01'57 391939.55 km

December 8, 1891 17:13:16 First Quarter 16°22'23 371159.31 km

We subtract 6 Saros Cycles from the date of the first eclipse:

June 6, 1891 - 108 years 68 days 4 hours 12 minutes

Input interpretation

Saturday, June 6, 1891 – 108 years 68 days 4 hours 12 minutes

Result

7:48 pm LMT | Saturday, March 29, 1783

01/04/1783	21.43	Eclisse parziale. Magnitud. = 0,33	Settentrionale	5.53	18.35

Reggio-Messina Earthquakes: 5 strong shocks, greater than Mw 5.9, between February 5 and March 28, 1783.

April 1, 1783 20:53:21 New Moon 12°00'26 388593.67 km

Now we add from the date of the first eclipse 6 Saros Cycles:

June 6, 1891 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Saturday, June 6, 1891 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Friday, August 13, 1999

11/08/1999	12.04	Eclisse totale.	Settentrionale	5.13	19.17

1999-08-05 14:57 Etna - Versante sud-occidentale

1999-08-30 20:52 Sicilia centro-orientale

August 4, 1999 17:26:36 Last quarter 11°53'41 370968.67 km

August 11, 1999 11:08:30 New Moon 18°21'12 373327.83 km

August 26, 1999 23:47:49 Full Moon 03°17'30 383105.83 km

Let's add to this last eclipse date, a Saros Cycle:

Aug 11, 1999 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Wednesday, August 11, 1999 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Tuesday, August 22, 2017

21/08/2017	19.27	Eclisse totale.	Settentrionale	5.24	19.01

2017-08-19	11:38	Etna - Versante sud-occidentale
2017-08-21	18:57	Isola d'Ischia
2017-08-23	03:04	
2017-08-23	09:16	Stretto di Sicilia
2017-08-25	17:10	Ionio meridionale
2017-08-25	21:57	Etna - Versante sud-occidentale

21 August 2017 18:30:11 New Moon 28°52'56 372113.99 km

And also:

June 6, 1891 - 18 years 11 days 8 hours 42 minutes

Input interpretation

Saturday, June 6, 1891 – 18 years 11 days 8 hours 42 minutes

Result

3:18 pm RMT | Sunday, May 25, 1873

We have:

26/05/1873	10.13	Eclisse parziale. Magnitud. = 0,89	Settentrionale	4.40	19.34

and:

1873-05-16	19:35	Reggiano	Mw = 5.01
1873-05-21	17	Moncalieri (TO)	MM = 3.50

May 12, 1873 11:17:54 Full Moon 21°45'09 384793.48 km

May 19, 1873 11:00:10 Last Quarter 28°28'49 369711.58 km

May 26, 1873 09:20:23 New Moon 05°08'20 382345.90 km

We note that:

June 29, 1873 Province of Belluno 6.3 Richter IX Mercalli

July 12, 1873 Val di Comino VII-VIII Mercalli

June 24, 1873 21:12:32 New Moon 03°19'52 392935.27 km

July 2, 1873 23:10:29 First quarter 11°02'17 400582.40 km

July 10, 1873 06:33:33 Full Moon 18°00'12 364937.25 km

From the date of this seismic event, let's try to add 6 Saros Cycles

1873-07-12 06:06 Val Comino Mw = 5.38

July 12, 1873 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Saturday, July 12, 1873 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Friday, September 18, 1981

And also from the other date:

June 29, 1873 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Sunday, June 29, 1873 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Saturday, September 5, 1981

We get the following dates: 05.09.1981 and 18.09.1981

1981-09-03 23:29 Tirreno meridionale

1981-09-13	04:49	Etna - S. Maria Ammalati (Acireale)
1981-09-21	01:40	Potentino
1981-09-21	16:12	Potentino
1981-09-24	12:20	Potentino

September 6, 1981 13:25:33 First quarter 13°51'21 403425.26 km

September 14, 1981 03:08:42 Full Moon 21°12'55 371191.76 km

September 20, 1981 19:47:24 Last quarter 27°44'44 371571.97 km

September 28, 1981 04:07:13 New Moon 04°56'43 395644.44 km

The **Monti della Meta** are a short mountain range, a subgroup of the Monti Marsicani, on the border between Lazio, Abruzzo and Molise, part of the ridge. The main shock occurred in the late afternoon of Monday 7 May, around 17:50, recording a moment magnitude of 5.9 and an intensity equal to the VIII degree of the Mercalli scale. Its effects spread over a vast area between Abruzzo, Lazio and Molise, also marginally affecting Campania. The epicentre was located near San Donato Val di Comino (FR);

1984-05-07 17:50 Monti della Meta Mw = 5.86

May 1, 1984 03:45:18 New Moon 10°57'20 395649.94 km

May 8, 1984 11:49:41 First Quarter 18°03'50 371550.44 km

May 30, 1984 16:47:51 New Moon 09°26'14 385352.42 km

30/05/1984	17.46	Eclisse anulare.	Settentrionale	4.38	19.37

We subtract from the date of this eclipse, 6 Saros cycles:

May 30, 1984 - 108 years 68 days 4 hours 12 minutes

Input interpretation

Wednesday, May 30, 1984 – 108 years 68 days 4 hours 12 minutes

Result

7:48 pm RMT | Wednesday, March 22, 1876

25/03/1876	21.06	Eclisse anulare.	Settentrionale	6.05	18.28

1876-03-18	Malcesine (VR)	Mw = 3.5
1876-03-28 01	Alpago Cansiglio	Mw = 3.70

March 18, 1876 01:24:40 Last quarter 27°49'02 404277.14 km

March 25, 1876 20:11:45 New Moon 05°32'04 377676.64 km

We subtract from the date of the earthquake 07.05.1984, 7 Saros cycles:

May, 7 1984 - 126 years 79 days 12 hours 54 minutes

Input interpretation

Monday, May 7, 1984 – 126 years 79 days 12 hours 54 minutes

Result

11:06 am LMT | Tuesday, February 16, 1858

15/03/1858	13.07	Eclisse anulare.	Settentrionale	6.23	18.16

February 5, 1858 21:16:46 Last quarter 16°50'57 402742.40 km

February 13, 1858 22:12:47 New Moon 24°58'51 387793.83 km

February 21, 1858 00:58:42 First quarter 02°09'22 370390.40 km

February 27, 1858 22:05:13 Full Moon 09°04'06 379280.97 km

March 7, 1858 18:10:54 Last quarter 16°54'50 404255.10 km

March 15, 1858 12:12:14 New Moon 24°38'41 376480.41 km

22 March 1858 07:42:49 First quarter 01°24'46 370660.10 km

29 March 1858 12:07:39 Full Moon 08°31'03 390544.82 km

1858-02-05	03:30	Vallese, Stalden-Visp (Svizzera)
1858-02-23	21:30	Stalden-Visp
1858-03-07		Vibonati (prov. Salerno – Campania)
1858-03-07		Salerno
1858-03-07	14	Campania meridionale Mw = 5.39

From the previous date, subtracting two synodic months, 59 days 1 hour 28 minutes 6 seconds, we obtain:

February 16, 1858 - 59 days 1 hour 28 minutes 6 seconds

Input interpretation

Tuesday, February 16, 1858 – 59 days 1 hour 28 minutes 6 seconds

Result

10:31:54 pm LMT | Friday, December 18, 1857

16 December 1857 11:01:39 New Moon 24°30'51 404959.45 km

This date, December 18, 1857 is very close to the one that occurred on December 16-17, 1857 in Basilicata – Principato Citra. The earthquake, with epicenter Montemurro and with a magnitude of 7.1 (XI Mercalli degree), was felt as far as Terracina and was triggered with two intense shocks a few seconds apart, at 22:15.

We report this seismic event, as it was described by Giuseppe Mercalli, in his “Vulcani e Fenomeni Vulcanici in Italia”:

Anno 1856, in tutto il bacino del Mediterraneo (1).

Verso le 2 ant. del 12 ottobre 1856 un terremoto rovinoso colpì le isole di Malta e di Gozzo: si succedettero l'una dopo l'altra due scosse. La seconda più forte ed accompagnata da terribile rumore. Il terremoto si estese alla Sicilia; si sentì, ma non vi furono danni a Siracusa; venne invece grandemente danneggiato Gran Michele presso Palermo (ivi le scosse furono E.-O.). A Napoli alle 2 ant. si sentirono parecchie scosse molto forti (N-S. poi E-O.) che si estesero anche a Pozzuoli, Castellamare, Avellino, Bari. Scosse deboli si avvertirono ad Ancona alle 2. 10′ ant., ed a Parma alle 2 ant. Contemporaneamente o quasi forti scosse si sentirono a Corfù, Prevesa (Albania), Ragusa, Spalatro, ecc. Verso le 3 ant. del 12 un terremoto molto disastroso conquassò Candia ed altre isole dell'Arcipelago Greco.

Durante il terremoto un capitano, che si trovava in mare in vista di Candia, osservò una fortissima agitazione nell'ago calamitato della bussola.

Essendo il terremoto di Candia posteriore, ma più violento di quello di Malta e Sicilia, penso che non si possono attribuire ambedue all'attività di un medesimo focolare sismico; ma che si tratti di due focolari sismici distinti, uno dei quali fu causa occasionale del risveglio dell'altro.

Anno 1857, in Basilicata e Principato citra (2).

Nella notte 16-17 dicembre di questo anno ebbe principio un terribile terremoto, che colpì la Basilicata ed il Principato citra e si estese in Puglia, nel Principato ultra, a Napoli, in Terra di Lavoro, ecc. La prima scossa preceduta immediatamente ed accompagnata da sordo rumore sotterraneo avvenne alle 10.15′ pom., durò 20″ e fu seguita, dopo 3′ circa, da un'altra più terribile che durò circa il doppio e produsse immense ruine massime nell'alta valle dell'Agri. Distrusse quasi interamente Montemurro, Saponara, Viggiano; e cagionò grandi ruine anche a Tito, S. Angelo, Marsico Nuovo, Paterno, Tramutola, Castel-Saraceno, Calvello, Potenza, ecc. in Basilicata; ed a Polla, Pertosa, Auletta, Montesano, Atena, ecc. in Principato citra. Perirono più di 12,300 persone. In molti luoghi si aprirono crepacci nel suolo, e avvennero scoscendimenti nelle montagne.

La prima scossa fu dapprincipio sussultoria poi ondulatoria e vorticosa. Replicarono un'ora dopo e parecchie volte nella notte 16-17 e con ispeciale violenza alle 3 ed alle 5 ant. Nel giorno seguente e poi per più di un anno continuarono a ripetersi in Basilicata le scosse più o meno intense e più o meno frequenti (3).

Si notarono diversi fenomeni precursori del terremoto. Circa un mese prima si avvertirono lievi sussulti a Saponara, e nel 7 dicembre si sentì a Potenza una detonazione sotterranea simile allo scoppio d'una mina ed una scossa mediocre. L'acqua mancò o si fece torbida, o diminuì nei pozzi e nelle sorgenti minerali di Tito. In alcuni pozzi invece l'acqua aumentò dopo il terremoto. Parecchi giorni prima del 16 dicembre gli animali domestici e massime i porci diedero segni d'inquietudine e di sofferenza. Prima ed al momento della prima scossa si vide una *fascia di fuoco* ed una *trave di fuoco* nell'aria; in valle d'Agri apparve una folta nebbia, ed in alcuni luoghi si sentì nell'aria un soffocante odore di solfo,

(1) Perrey, *Mém. couronnées de l'Acad. de Brux.* in 8.° t. VIII, pag. 69.

(2) Capocci, *Op. cit.* Mem. I.ª — Greco, *Degli scrittori che han. tratt. dei trem. di Basilicata*, pag. 56-120. — Mallet, *The great Neapolitan earthquake of* 1857, 2 Vol. London 1863 — Perrey, *Op. cit.* An. 1859, t. X, p. 108.

(3) In dicembre replicarono tutti i giorni. Ecco le principali: — Nel 19, a 6.10′ a. ed alle 5.30′ p., a Salerno, alcune; nel 19 alle 6 p., nel 20 e nel 22 alla 1 p., a Napoli; nel 20 e 21 a Lagonegro, parecchie; nel 20 alle 5.45′ p. e nel 22 alle 0.50′ p., a Salerno; nel 23 a Balvano; nel 26 alle 3 ed alle 6 ant. a Montemurro avvengono due scosse molto violente, che fanno ruinare i pochi edifici rimasti ancora in piedi (la prima sentita anche a Viggiano); il 26, di notte, in Sasso presso Castelabate (Basilicata) per una scossa di terremoto si spacca il suolo. Nel 28, verso 9 p., una scossa forte, e nel 29 alle 6 ed alle 7.30′ p., due altre a Sala (Principato citra); nel 29, a Potenza una forte alle 6.45′ p., e poi parecchie nella notte. Nel 29 e 30 a Resina, vibrazioni del suolo quasi continue. — Le repliche del 1858 sono registrate nel *Catalogo*.

il quale si ripetè anche colle repliche. A Calvello forieri del disastro furono un gagliardo muggito sotterraneo e diverse meteore ignite.

La prima scossa si sentì verso Sud fino a Reggio Calabria, verso Est a Brindisi, a Nord fino a Terracina. A Napoli si sentirono alle 10.10′ p. due scosse ondulatorie N-S., di mediocre intensità e tre altre leggiere scosse alle 3 ed alle 5 ant. del 17. È notevole che in generale vennero lesionate le case sulla costa Adriatica tra Polignano e Manfredonia, e che invece non vi furono danni a Melfi.

Anno 1859, *nel Trevigiano* (1).

Una terza volta negli ultimi due secoli (le altre due furono nel 1695 e 1836) violentissimi terremoti ebbero il loro centro nel Trevigiano. Il 20 gennaio 1859, alle 8.56′ ant., si succedettero in 10″ tre scosse, la prima ondulatoria da SSE. a NNO., le altre due sussultorie. A Collalto, ove ebbero la maggior violenza, erano accompagnate da un fortissimo rumore sotterraneo simile a quello d'una locomotiva. Nell' istesso giorno a Collalto replicarono scosse meno forti alle 9.10′ a., alle 11 a., alla 1 p., alle 2 p., alle 4 p.; e nel 21 verso le 9 p. (forte) e nel 22 una alle 6.30′ ant., poi parecchie altre nella giornata. In generale le repliche erano accompagnate da un rumore sordo ovvero da una detonazione simile ad un colpo di cannone. Si sentirono rumori sotterranei anche non accompagnati da scosse. In seguito fino al 9 marzo ne replicarono tutti i giorni; la più parte sussultorie, e specialmente furono forti una avvenuta nella sera del 28 ed a mezzodì del 30 gennaio. Come si vede nel *Catalogo* a Collalto le repliche continuarono fino alla fine di maggio, ed in tutto se ne contarono circa un centinaio.

A Collalto caddero molti camini e le case mal costruite. Le prime scosse furono pure rovinose o fortissime a Falze, Pieve di Soligo, Sernaglia, Moriago, Col S. Martino, Guja, Combaj, Miano, San Pietro, e fino a Valdobbiadene e Vidor sul Piave. Le scosse s' indebolirono assai presto verso Nord-Est, sicchè ad Udine furono appena sensibili; conservarono invece molta forza verso Venezia e fino a Trieste. La direzione delle scosse fu N-S. a Treviso; a Venezia N-S. ed ENE-OSO.; a Belluno e Sacile NE-SO.; ad Agordo NNO-SSE.; a Valdobbiadene, Udine, Vicenza, Trento E-O.

Il suolo si aprì in diversi luoghi; dalle montagne si staccarono grosse rupi: le acque corsero torbide per alcun tempo.

Qualche minuto avanti la prima scossa i cavalli del Conte di Collalto diedero segni di grande inquietudine.

Anno 1859, *a Norcia* (2).

Il giorno 22 agosto tra 1.15′ ed 1.30′ pom., a Norcia si sentì una detonazione sotterranea, simile ad una scarica d'artiglieria, e subito dopo un violento terremoto, che in 7″ riprese tre volte con forza sempre maggiore, e con movimento prima sussultorio poi ondulatorio NE-SO. In Norcia le case mal costruite rovinarono interamente, ed anche tutte le altre patirono gravi danni. Vi furono 106 morti ed 80 feriti. Quasi egualmente soffrirono Campi, Casali, Capo del Colle e la Villa di Sant' Angelo; assai meno invece Abeto, Todiano, la Villa d'Ancarano e Fuscaro. Il terremoto si sentì con poca intensità a Cascia ed a Trevi. Ebbe forza mediocre verso Nord fino a Pesaro, e verso Sud fino a Roma. Si notò che i maggiori danni accaddero nei paesi situati su terreni mobili, come per es. le alluvioni.

A Norcia le ondulazioni, essendo dirette da NE. a SO., parevano venire dalla parte di Monte Pattino, ove si ritenne fosse il centro dello scuotimento anche perchè ivi le detonazioni sotterranee erano più numerose e più forti.

(1) Perrey, *Mém. cour. de l'Acad. Belgique*. t. XIII, pag. 34-36. — A. Berti, negli *Atti dell'Istituto Veneto*, t. IV, ser. 3ª.

(2) Secchi, *Escursione scientifica fatta a Norcia*, ecc. 44 pag. in 4°. — Perrey *Op. cit.*, pag. 63-66. — Serpieri, *Supplem. alla Metereologia ital.* 1872, pag. 8.

We note that, adding 8 Saros cycles to the date of the seismic event, we obtain:

December 18, 1857 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Friday, December 18, 1857 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Monday, March 18, 2002

March 14, 2002	02:02:31	New Moon	23°18'44	406 707.13 km
March 28, 2002	18:24:53	Full Moon	07°53'33	357 207.65 km

And, regarding seismicity:

2002-03-10	12:39	Tirreno meridionale	Mw = 4.07
2002-03-24	23:05	Etna - Versante orientale	Mw = 3.27
2002-04-05	04:51	Isole Eolie	Mw = 4.06

Adding to the obtained date, a further Saros cycle, we obtain:

March 18, 2002 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Monday, March 18, 2002 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Sunday, March 29, 2020

And also:

2020-03-22	10:32	Etna - Versante orientale	Mw = 3.44
2020-04-03	03:52	Ionio settentrionale	Mw = 4.15
2020-04-03	14:18	Ionio settentrionale	Mw = 4.09

March 24, 2020	09:28:13	New Moon	04°12'16	406 672.41 km
April 8, 2020	02:35:05	Full Moon	18°43'38	357 029.27 km

Adding 7 Saros cycles to the previous date, we get:

December 18, 1857 + 126 years 79 days 12 hours 54 minutes

Input interpretation

Friday, December 18, 1857 + 126 years 79 days 12 hours 54 minutes

Result

12:54 pm CET | Tuesday, March 6, 1984

To this date we add two synodic months:

March 6, 1984 + 59 days 1 hour 28 minutes 6 seconds

Input interpretation

Tuesday, March 6, 1984 + 59 days 1 hour 28 minutes 6 seconds

Result

1:28:06 am CEST | Friday, May 4, 1984

And regarding seismicity:

1984-04-29	05:02	Umbria settentrionale	Mw = 5.62
1984-04-29	05:33		
1984-04-29	05:49	Umbria settentrionale	
1984-04-29	15:03	Umbria settentrionale	
1984-04-30	21:04	Umbria settentrionale	
1984-04-30	22:39	Umbria settentrionale	
1984-05-01	22:14	Costa pisano-livornese	
1984-05-03	08:56	Faucigny	
1984-05-07	17:50	Monti della Meta	Mw = 5.86
1984-05-26	15:43	Tirreno meridionale	Mw = 4.08

May 1, 1984 03:45:18 New Moon 10°57'20 395 649.94 km

May 30, 1984 16:47:51 New Moon 09°26'14 385 352.42 km

We note also that:

30/05/1984	17.46	Eclisse anulare.	Settentrionale	4.38	19.37

Now, we have:

« In una mia precedente Nota (1) esposi i dati delle osservazioni sulle quali basai l'apprezzamento della provenienza delle ondulazioni sismiche avvertite in Italia il 22 marzo 1894, senza peraltro conoscere ancora in dettaglio le circostanze che i fenomeni sismici avevano presentate nel Giappone, luogo della loro origine, nonchè altrove.

« Come ebbi a comunicare al sig. direttore del R. Ufficio Centrale di Meteorologia e Geodinamica, il mio assistente, incaricato di osservare le livelle quanto più spesso è possibile, le sorprese alle $12^h 22^m$ di quel giorno in ampia oscillazione. Tali livelle, impiantate nell'osservatorio della Grande Sentinella in Casamicciola, mi furono fornite dall'Istituto ottico meccanico Salmoiraghi di Milano; la scala è divisa in 90 parti equidistanti di 3 mm.; nella livella situata nel senso del meridiano una parte corrisponde ad $1''52$; in quella situata nel senso del parallelo una parte equivale ad $1''55$. Tutte e due sono solidamente fissate al pilastro sismico ed ora, dopo un periodo di adattamento, si mantengono pressochè immobili o subiscono lente e piccole variazioni, talvolta in coincidenza con fenomeni sismici lontani.

« All'ora indicata del 22 marzo la bolla della livella Sud-Nord oscillava di 4 parti (corrispondenti a $6''08$) e quella Ovest-Est oscillava di 2 in 3 divisioni ($3''10$ a $4''65$ = in media $3''875$); ogni oscillazione completa durava circa 6 minuti secondi; le oscillazioni verso Nord della prima coincidevano con quelle verso Est della seconda, talchè ne risulta la direzione di N. 32° 30′ 39″ E. a S. 32° 30′ 39″ W. e l'ampiezza di $7''21$, certamente inferiore alla vera per le ragioni anzidette. L'estremità meridionale della bolla Nord-Sud che in istato di quiete prima e poi segnava 13′9, nelle sue escurzioni verso Sud toccava appena 13, mentre in quelle verso Nord arriva a 17; da questa circostanza che non ammetteva incertezza, mi parve poter dedurre che, a somiglianza delle onde liquide, la maggiore inclinazione ne accusasse la provenienza, nel qual caso il radiante si sarebbe trovato dal lato di N.-E.

« Avvisato del fenomeno mi recai sul posto con la speranza di sorprendere l'arrivo dell'onda dalla parte opposta, ma in tre ore d'attenta osservazione nulla più avvenne.

« Calcolato il circolo massimo terrestre coincidente con la direzione osservata (trascurando lo schiacciamento), ne ottengo i seguenti elementi:

Longitudine del nodo ascendente coll'equatore = 22° 35′ W. Casamicciola
ossia 9° 0′ W. Greenwich
Inclinazione sull'equatore = 65° 58′

« Questo circolo massimo, da Casamicciola verso N-E, dopo la nostra penisola incontra l'Ungheria, la Russia e la Siberia e passando al Nord del Giappone prosegue in pieno Oceano Pacifico. Esclusi i paesi vicini stante la lunga durata delle ondulazioni, non mi parve dover ricercare l'epicentro nella Russia o nella Siberia, regioni di poca o niuna attività sismica, ma mi sof-

fermai al Giappone, ed ecco alcune coordinate corrispondenti in quei paraggi al circolo massimo indicato, con le distanze da Casamicciola, da cui si scorge che la linea calcolata passa pel Nord dell'isola Yeso, cioè:

Longitudine Est Greenwich	Latitudine Nord	Distanza da Casamicciola
135°	52° 49′	Km. 8185
140°	49° 7′	» 8725
145°	44° 30′	» 9362

« L'apprezzamento della distanza dell'epicentro, pure quando si faccia a base matematica, anzichè sui concetti qui sopra esposti, è sempre vago, essendo variabile il cardine principale a ciò necessario, vale a dire la velocità di propagazione. Questa può essere costante tra un centro sismico ed una determinata stazione, perchè in tal caso i terreni attraversati sono sempre gli stessi, ma l'osservazione ci rivela che la velocità di propagazione varia a seconda del mezzo.

On **March 22, 1894**, a strong earthquake shook the northern part of Japan.

We have that:

06/04/1894	4.55	Eclisse anulare.	Settentrionale	5.45	18.41

March 21, 1894 14:11:07 Full Moon 00°57'31 376990.73 km

Subtracting 6 Saros cycles:

March 22, 1894 - 108 years 68 days 4 hours 12 minutes

Input interpretation

Thursday, March 22, 1894 – 108 years 68 days 4 hours 12 minutes

Result

7:48 pm LMT | Thursday, January 12, 1786

1786-01-15	Bacino di Gubbio
1786-01-17	Bacino di Gubbio

January 14, 1786 12:46:52 Full Moon 24°37'51 383765.83 km

We have also:

30/01/1786	3.44	Eclisse totale.	Settentrionale	7.25	17.23

Earthquake Argentina October 27, 1894

29/09/1894	6.37	Eclisse totale.	Meridionale	6.05	17.55

October 28, 1894 17:57:11 New Moon 05°19'13 381944.57 km

November 13, 1894 07:49:13 Full Moon 20°57'11 373882.06 km

The earthquake of **November 16, 1894** was a seismic event that struck southern Calabria and Sicily at 17:52, with its epicenter historically identified in the city of Palmi. The intensity of the event, which falls within the IX degree of the Mercalli scale and which mostly affected the localities of the Palmi District, also caused a violent tsunami that even affected the Campania coast, with greater damage occurring at Capo Pezzo towards Palmi.

Adding 6 Saros cycles:

October 27, 1894 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Saturday, October 27, 1894 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CET | Friday, January 3, 2003

2003-01-26 19:57	Appennino forlivese
2003-01-26 20:01	Appennino forlivese
2003-01-26 20:15	Appennino forlivese
2003-01-27 04:03	Molise

1 February 2003 10:48:23 New Moon 12°09'16 386629.29 km

Fisica terrestre. — *Il terremoto dell'India del 12 giugno 1897 registrato in Europa.* Nota di G. AGAMENNONE, presentata dal Socio TACCHINI.

Circa $^1/_4$ d'ora dopo il mezzogiorno del 12 giugno, cominciarono ad essere perturbati gli strumenti di gran numero d'Osservatorî italiani, e la perturbazione raggiunse in breve proporzioni veramente straordinarie e non cessò che lungo tempo appresso. Perturbazioni analoghe avvennero nella maggior parte dei magnetografi ed in altri delicati strumenti disseminati qua e là in Europa.

DISTANZE dal presunto epicentro	LOCALITÀ	ORE (t. m. E. C.)		VELOCITÀ in Km. al secondo in base alla	
				prima ora di Calcutta	seconda ora di Calcutta
Km.		h	m	Km.	Km.
400	Calcutta.	12	4,6	—	—
		»	7,0	—	—
5980	Pietroburgo (Pawlowsk)	»	17,0	8,0	9,2
7020	Potsdam.	»	17,0	8,9	11,0
7150	* Catania	»	17,4	8,8	10,8
7150	Portici	»	17,9	8,5	10,3
7170	Mineo	»	16,0	9,9	12,5
7170	* Ischia	»	17,2	9,0	11,1
7220	Spinea.	»	18,6	8,1	9,8
7240	* Padova	»	17,0	9,2	11,4
7250	Velletri	»	17,0	9,2	11,4

India Earthquake, **June 12, 1897**

We note that:

June 14, 1897 21:01:27 Full Moon 23°58'58 360699.12 km

(perigee)

Subtracting 8 Saros cycles:

June 12, 1897 - 144 years 90 days 21 hours 36 minutes

Input interpretation

Saturday, June 12, 1897 – 144 years 90 days 21 hours 36 minutes

Result

2:24 am LMT | Tuesday, March 13, 1753

1753-03-09 13:15 Val Chisone Mw = 5.16

Monday, March 5, 1753 03:46:37 New Moon 14°47'03 399289.66 km

Monday, March 12, 1753 15:55:42 First Quarter 22°16'25 373224.75 km

Adding 6 Saros cycles

June 12, 1897 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Saturday, June 12, 1897 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Friday, August 19, 2005

2005-08-14	07:06	Tirreno meridionale
2005-08-14	21:56	Etna - Versante nord-orientale

2005-08-22 12:02 Costa laziale

---

13 August 2005 02:38:33 First quarter 20°27'35 382620.34 km

19 August 2005 17:52:59 Full Moon 26°50'10 357648.71 km

We have also, subtracting 1 Saros cycle:

June 12, 1897 - 18 years 11 days 8 hours 42 minutes

Input interpretation

Saturday, June 12, 1897 – 18 years 11 days 8 hours 42 minutes

Result

3:18 pm RMT | Saturday, May 31, 1879

1879-06-16 19 Etna - Bongiardo (S. Venerina)

19 June 1879 20:19:42 New Moon 28°06'53 397614.52 km

And also, adding 1 Saros cycle:

June 12, 1897 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Saturday, June 12, 1897 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Wednesday, June 23, 1915

1915-06-20	14:21	Marsica

June 12, 1915 18:56:52 New Moon 20°42'33 405397.89 km

June 20, 1915 14:24:14 First quarter 28°10'06 378384.18 km

The 1915 Marsica earthquake, also known as the Avezzano earthquake, was a dramatic seismic event that occurred on January 13, 1915, with a magnitude of 7.0 on the Richter scale, which devastated the historical-geographical region of Marsica, in Abruzzo, and the neighboring areas of contemporary Lazio, such as the Liri Valley and Cicolano.

15 January 1915 14:41:38 New Moon 24°23'09 371546.44 km

January 13, 1915 - 18 years 11 days 8 hours 42 minutes

Input interpretation

Wednesday, January 13, 1915 – 18 years 11 days 8 hours 42 minutes

Result

3:18 pm CET | Friday, January 1, 1897

1897-01-16	12:10	Argenta	Mw = 4.9

January 3, 1897 06:03:21 New Moon 13°11'21 372552.62 km

January 10, 1897 21:45:39 First Quarter 20°59'32 403960.15 km

January 18, 1897 20:16:50 Full Moon 29°04'29 383148.18 km

Now, adding 1 Saros cycle to the earthquake data, we obtain:

January 13, 1915 +18 years 11 days 8 hours 42 minutes

Input interpretation

Wednesday, January 13, 1915 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Tuesday, January 24, 1933

1933-01-24 01:43 Vallese, Visp Mw = 4.5

25 January 1933 23:19:35 New Moon 05°34'21 370566.11 km

Transit of Venus over the Sun (Inferior Conjunctions of Venus)

A causa della diversa inclinazione delle orbite dei due pianeti, il transito di Venere sul Sole è un fenomeno piuttosto raro che avviene con varia periodicità ed è caratterizzato da un ciclo stabile di 243 anni. Fu previsto per la prima volta da Keplero (1571-1630) per l'anno 1631, da allora sino ai nostri giorni si sono verificate tre coppie di eventi, separati da otto anni, distanziate alternativamente da 121,5 e 105,5 anni. L'ultimo transito di Venere è avvenuto nel 1882, mentre il prossimo avrà luogo l'8 giugno 2004.

Qui di seguito l'elenco dei transiti avvenuti a partire dal XVII secolo:

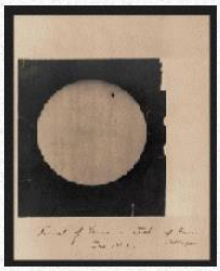
1631 7 dicembre
1639 4 dicembre
1761 6 giugno
1769 3 giugno
1874 9 dicembre
1882 6 dicembre.

I prossimi due transiti avverranno nei giorni:

2004 8 giugno
2012 6 giugno.

Dopodiché, per poter assistere dalla Terra ad un nuovo passaggio di Venere sul Sole, bisognerà attendere più di un secolo:

2117 11 dicembre
2125 8 dicembre.



Fotografia di Venere sul disco solare relativa al passaggio del 1882 (crediti: *Vassar College*, Hudson Valley – New York).

We observe that:

December, 6-7 1631

23/11/1631	15.50	Eclisse parziale. Magnitud. = 0,27	Meridionale	7.10	16.44

1631-12-15	21	Vesuvius area

June, 6 1761

03/06/1761	2.18	Eclisse parziale. Magnitud. = 0,79	Settentrionale	4.36	19.40

1761-06-10	Appennino forlivese	Mw = 3.7

December, 8-9 1874

1874-12-06 15:50 Val Comino Mw = 5.48

June, 8 2004

2004-06-01 10:32 Etna - Piano Pernicana (Linguaglossa) Mw = 3.73

2004-06-01 11:18 Etna - Versante nord-orientale

June, 6 2012

21/05/2012	0.53	Eclisse anulare.	Settentrionale	4.44	19.30

2012-05-20 02:03 Pianura emiliana Mw = 6.09

2012-05-29 10:55 Pianura emiliana Mw = 5.50

2012-06-06 04:08 Ravenna Mw = 4.21

2012-1874 = 138

1874-1761 = 113

1761-1631 = 130

Mean = 127

2004-1874 = 130

1874-1761 = 113

1761-1631 = 130

Mean = 124.33

(127+124.33)/2 = 125.665

From

June, 6 1761 + 125.665 years

Input interpretation

Saturday, June 6, 1761 + 125.7 years

Result

5:24 pm RMT | Thursday, February 3, 1887

22/02/1887	22.36	Eclisse anulare.	Meridionale	6.57	17.51

1887-02-23 05:21 Liguria occidentale Mw = 6.27

The Moon rotates around the Earth along an elliptical orbit. The plane on which the Moon rotates is inclined by about 5° with respect to the Ecliptic.

The line of intersection between the two planes is called the "line of nodes" and identifies two points on the lunar orbit called the ascending node N and the descending node N'. The node is ascending because the Moon passes from the part of its orbit that is below the Ecliptic to the part above it. The node is descending when the opposite occurs.

The line of nodes rotates in the opposite direction with respect to the motion of the Moon along its orbit. In conclusion, the time taken for the line of nodes to complete a complete rotation is defined as the Saros or eclipse cycle and corresponds to 18 years and 10 or 11 days (the number of days depends on the number of leap years in each cycle). The line that connects the apogee to the perigee is called the line of apsides and rotates around the Moon, as does the line of nodes, in the same direction with a period of 8.85 years.

The Moon is the celestial body closest to the Earth. Its average distance is 384,400 km. During the course of a lunation, the distance between the Earth and the Moon varies by approximately 45 thousand km. Furthermore, the maximum (apogee) and minimum (perigee) distances do not remain constant but vary according to non-simple rules. There are many gravitational perturbations that influence the motion of our satellite, consequently it is difficult to predict the real measurements of the apogee and perigee. When the major axis of the lunar orbit is perpendicular to the Earth-Moon line, the difference between perigee and apogee is reduced. The minimum Earth-Moon distance will be reached on January 1, 2257, and the minimum on January 7, 2266.

Below are the main data relating to the Earth-Moon distances.

Average apogee 405,503 km

maximum 406,720 km

Average perigee 363,296 km

minimum 356,371 km

Even if it does not seem so, the Earth and the Moon constitute a binary system, that is, they rotate around each other. The center of gravity of this system is 17 km below the Earth's surfaces.

Now, we analyze various Ischia's earthquakes:

Earthquakes of July 28-29 1762 on the island of Ischia

4 Agosto	1762	20:13:14	Luna Piena (apogeo)	12°16'06	405 958.92 km
21 Luglio	1762	08:29:40	Luna Nuova (perigeo)	28°24'27	358 999.78 km

Earthquakes of March 18, 1796 on the island of Ischia

16 Marzo	1796	08:55:16	Primo quarto	26°31'40	370 639.65 km
23 Marzo	1796	12:57:07	Luna Piena	03°37'59	389 930.12 km

Earthquake of February 2, 1828 on the island of Ischia

1 Febbraio	1828	01:17:45	Luna Piena	11°13'37	404 462.28 km

Earthquake of March 5-6, 1841 on the island of Ischia

7 Marzo 1841 13:36:40 Luna Piena 16°51'26 370 608.02 km

We have also:

21/02/1841	12.03	Eclisse parziale. Magnitud. = 0,21	Settentrionale	6.58	17.50

Earthquake of June 7, 1852 on the island of Ischia

2 Giugno 1852 06:26:05 Luna Piena 11°48'28 366 349.37 km

9 Giugno 1852 15:15:04 Ultimo quarto 18°51'06 401 385.18 km

We have also:

17/06/1852	17.58	Eclisse parziale. Magnitud. = 0,79	Meridionale	4.34	19.47

Earthquake of January 30, 1863 on the island of Ischia

3 Febbraio 1863 22:25:11 Luna Piena 14°39'39 399 740.48 km

Earthquake of August 15-16, 1867 on the island of Ischia

15 Agosto 1867 10:37:25 Luna Piena 22°05'13 398 522.88 km

We have also:

29/08/1867	14.14	Eclisse totale.	Meridionale	5.32	18.49

Earthquake of July 13, 1875 on the island of Ischia

10 Luglio 1875 10:40:21 Primo quarto 17°42'57 399 260.14 km

18 Luglio 1875 13:27:03 Luna Piena 25°27'19 394 866.26 km

Earthquake of July 24-25-26, 1880 on the island of Ischia

21 Luglio 1880 21:02:26 Luna Piena 29°23'06 361 641.58 km

(perigeo)

We have also:

07/07/1880	14.10	Eclisse anulare.	Meridionale	4.42	19.47

Earthquake of March 4, 1881 on the island of Ischia

28 Febbraio 1881 11:32:36 Luna Nuova 10°03'30 365 797.97 km

Earthquake of July 28, 1883 on the island of Ischia

20 Luglio 1883 03:30:58 Luna Piena 27°02'22 379 885.98 km

3 Agosto 1883 01:26:16 Luna Nuova 10°20'22 387 176.52 km

With regard the Full Moon and New Moon, we have the following Moon nodes values

Luna Piena	12°16'06	Luna Nuova	10°03'30
Luna Piena	03°37'59	Luna Nuova	10°20'22
Luna Piena	11°13'37		
Luna Piena	16°51'26		
Luna Piena	11°48'28		
Luna Piena	14°39'39		
Luna Piena	22°05'13		
Luna Piena	25°27'19		
Luna Piena	29°23'06		

The mean of the values concerning the Full Moon is:

12°16'06" + 03°37'59" + 11°13'37" + 16°51'26" + 11°48'28"

Input interpretation

12 degrees 16 arcminutes 6 arcseconds +
3 degrees 37 arcminutes 59 arcseconds +
11 degrees 13 arcminutes 37 arcseconds +
16 degrees 51 arcminutes 26 arcseconds +
11 degrees 48 arcminutes 28 arcseconds

Results

55 degrees 47 arcminutes 36 arcseconds

(55 degrees 47 arcminutes 36 arcseconds + 14°39'39" + 22°05'13" + 25°27'19" + 29°23'06")/9

Input interpretation

$\frac{1}{9}$ (55 degrees 47 arcminutes 36 arcseconds +
14 degrees 39 arcminutes 39 arcseconds +
22 degrees 5 arcminutes 13 arcseconds +
25 degrees 27 arcminutes 19 arcseconds +
29 degrees 23 arcminutes 6 arcseconds)

Results

16 degrees 22 arcminutes 32.56 arcseconds

16.38° (degrees)

Unit conversions

285.8 mrad (milliradians)

0.2858 radians

$1^{h}\ 5^{m}\ 30.17^{s}$ (right ascension)

18.2 grads
(unit officially deprecated)

0.182 quad (quadrants)

Interpretations

plane angle

angular elongation

Basic unit dimensions

[angle]

Corresponding quantities

Arc length s along the Earth's equator from $s = R\theta$:

1823 km (kilometers)

1.823×10^{6} meters

984.3 nmi (nautical miles)

1133 miles

Arc length s around the Earth at 45° latitude from $s = R\cos(45°)\theta$:

1289 km (kilometers)

1.289×10^6 meters

696 nmi (nautical miles)

801 miles

Rotation count N from $N = \varphi/(2\pi)$:

0.045 rot (rotations)

Slope percentage from [slope percentage] = 100% × tan(θ):

29.39 slope% (slope percent)

Electric loss factor d from $\delta = \tan^{-1}(d)$:

0.2939

Quality factor Q from $\delta d = \tan^{-1}(1/Q)$:

3.403

$\tan^{-1}(x)$ is the inverse tangent function

The mean of the values concerning the New Moon, is:

(10°03'30" + 10°20'22")/2

Input interpretation

$$\frac{1}{2}\,(10 \text{ degrees } 3 \text{ arcminutes } 30 \text{ arcseconds} + 10 \text{ degrees } 20 \text{ arcminutes } 22 \text{ arcseconds})$$

Results

10 degrees 11 arcminutes 56 arcseconds

10.2° (degrees)

Unit conversions

178 mrad (milliradians)

0.178 radians

---

40 m 47.73 s (right ascension)

11.33 grads
(unit officially deprecated)

0.1133 quad (quadrants)

Interpretations

plane angle

angular elongation

Basic unit dimensions

[angle]

Corresponding quantities

Arc length s along the Earth's equator from $s = R\theta$:

1135 km (kilometers)

1.135×10^6 meters

613 nmi (nautical miles)

705.5 miles

Arc length s around the Earth at 45° latitude from $s = R\cos(45°)\theta$:

802.8 km (kilometers)

802 803 meters

433.5 nmi (nautical miles)

498.8 miles

Rotation count N from $N = \varphi/(2\pi)$:

0.028 rot (rotations)

Slope percentage from [slope percentage] $= 100\% \times \tan(\theta)$:

17.99 slope% (slope percent)

Electric loss factor d from $\delta = \tan^{-1}(d)$:

0.1799

Quality factor Q from $\delta d = \tan^{-1}(1/Q)$:

5.558

$\tan^{-1}(x)$ is the inverse tangent function

From the sum of the radians results, after some easy calculations:

1/4(3/(0.2858 + 0.178))

Input

$$\frac{1}{4} \times \frac{3}{0.2858 + 0.178}$$

Result

1.617076326002587322121604139715394566623544631306597671410090556 2

…

1.617076326…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

And:

1/4(((7/5 sqrt((2 e)/log(π))))/(0.2858 + 0.178))

where

$$\frac{7}{5}\sqrt{\frac{2e}{\log(\pi)}} \approx 3.0509758$$

Input

$$\frac{1}{4} \times \frac{\frac{7}{5}\sqrt{\frac{2e}{\log(\pi)}}}{0.2858 + 0.178}$$

log(x) is the natural logarithm

Result

1.644553582769115124058485090296707576695136458804511126902198309 2

…

1.644553582769…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternative representations

$$\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}=\frac{7\sqrt{\frac{2e}{\log_e(\pi)}}}{0.4638\times4\times5}$$

$$\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}=\frac{7\sqrt{\frac{2e}{\log(a)\log_a(\pi)}}}{0.4638\times4\times5}$$

$$\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}=\frac{7\sqrt{-\frac{2e}{\mathrm{Li}_1(1-\pi)}}}{0.4638\times4\times5}$$

$\log_b(x)$ is the base-b logarithm

$\mathrm{Li}_n(x)$ is the polylogarithm function

Series representations

$$\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}=0.754636\sqrt{-1+\frac{2e}{\log(\pi)}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+\frac{2e}{\log(\pi)}\right)^{-k}$$

$$\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}=0.754636\sqrt{\frac{2e}{\log(-1+\pi)-\sum_{k=1}^{\infty}\frac{(-1)^k(-1+\pi)^{-k}}{k}}}$$

$$\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}=0.754636\sqrt{-1+\frac{2e}{\log(\pi)}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-1+\frac{2e}{\log(\pi)}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

Integral representations

$$\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4} = 0.754636\sqrt{\frac{2e}{\int_1^\pi \frac{1}{t}\,dt}}$$

$$\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4} = 0.754636\sqrt{\frac{4\,e\,i\,\pi}{\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{(-1+\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}} \quad \text{for } -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

i is the imaginary unit

And again:

((1/4(((7/5 sqrt((2 e)/log(π))))/(0.2858 + 0.178))))^15-11-Pi/4

Input

$$\left(\frac{1}{4}\times\frac{\frac{7}{5}\sqrt{\frac{2e}{\log(\pi)}}}{0.2858+0.178}\right)^{15}-11-\frac{\pi}{4}$$

$\log(x)$ is the natural logarithm

Result

1728.90…

1728.90…

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternative representations

$$\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}\right)^{15}-11-\frac{\pi}{4}=-11-\frac{\pi}{4}+\left(\frac{7\sqrt{\frac{2e}{\log_e(\pi)}}}{0.4638\times4\times5}\right)^{15}$$

$$\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}\right)^{15}-11-\frac{\pi}{4}=-11-\frac{\pi}{4}+\left(\frac{7\sqrt{\frac{2e}{\log(a)\log_a(\pi)}}}{0.4638\times4\times5}\right)^{15}$$

$$\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}\right)^{15}-11-\frac{\pi}{4}=-11-\frac{\pi}{4}+\left(\frac{7\sqrt{-\frac{2e}{\mathrm{Li}_1(1-\pi)}}}{0.4638\times4\times5}\right)^{15}$$

$\log_b(x)$ is the base- b logarithm

$\mathrm{Li}_n(x)$ is the polylogarithm function

Series representations

$$\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}\right)^{15}-11-\frac{\pi}{4}=$$

$$-11-0.25\,\pi+0.0146575\sqrt{-1+\frac{2e}{\log(\pi)}}^{\,15}\left(\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+\frac{2e}{\log(\pi)}\right)^{-k}\right)^{15}$$

$$\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}\right)^{15}-11-\frac{\pi}{4}=$$

$$-11-0.25\,\pi+0.0146575\sqrt{\frac{2e}{\log(-1+\pi)-\sum_{k=1}^{\infty}\frac{(-1)^k(-1+\pi)^{-k}}{k}}}^{15}$$

$$\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}\right)^{15}-11-\frac{\pi}{4}=$$

$$-11-0.25\,\pi+0.0146575\sqrt{-1+\frac{2e}{\log(\pi)}}^{15}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-1+\frac{2e}{\log(\pi)}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^{15}$$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

Integral representations

$$\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}\right)^{15}-11-\frac{\pi}{4}=-11-0.25\,\pi+0.0146575\sqrt{\frac{2e}{\int_1^{\pi}\frac{1}{t}\,dt}}^{15}$$

$$\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{(5\,(0.2858+0.178))\,4}\right)^{15}-11-\frac{\pi}{4}=$$

$$-11-0.25\,\pi+0.0146575\sqrt{\frac{4\,e\,i\,\pi}{\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{(-1+\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}}^{15}\quad\text{for}\ -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

i is the imaginary unit

(1/27((((1/4(((7/5 sqrt((2 e)/log(π))))/(0.2858 + 0.178))))^15-11-Pi/4)-1))^2+1/2

Input

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{4}\times\frac{\frac{7}{5}\sqrt{\frac{2e}{\log(\pi)}}}{0.2858+0.178}\right)^{15}-11-\frac{\pi}{4}\right)-1\right)\right)^2+\frac{1}{2}$$

$\log(x)$ is the natural logarithm

Result

4096.03…

4096.03…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality.

The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternative representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{4\,(5\,(0.2858+0.178))}\right)^{15}-11-\frac{\pi}{4}\right)-1\right)\right)^2+\frac{1}{2}=\frac{1}{2}+\left(\frac{1}{27}\left(-12-\frac{\pi}{4}+\left(\frac{7\sqrt{\frac{2e}{\log_e(\pi)}}}{0.4638\times4\times5}\right)^{15}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{4\,(5\,(0.2858+0.178))}\right)^{15}-11-\frac{\pi}{4}\right)-1\right)\right)^2+\frac{1}{2}=\frac{1}{2}+\left(\frac{1}{27}\left(-12-\frac{\pi}{4}+\left(\frac{7\sqrt{\frac{2e}{\log(a)\log_a(\pi)}}}{0.4638\times4\times5}\right)^{15}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{4\,(5\,(0.2858+0.178))}\right)^{15}-11-\frac{\pi}{4}\right)-1\right)\right)^2+\frac{1}{2}=$$
$$\frac{1}{2}+\left(\frac{1}{27}\left(-12-\frac{\pi}{4}+\left(\frac{7\sqrt{-\frac{2e}{\text{Li}_1(1-\pi)}}}{0.4638\times 4\times 5}\right)^{15}\right)\right)^2$$

$\log_b(x)$ is the base- b logarithm

$\text{Li}_n(x)$ is the polylogarithm function

Series representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{4\,(5\,(0.2858+0.178))}\right)^{15}-11-\frac{\pi}{4}\right)-1\right)\right)^2+\frac{1}{2}=\frac{1}{2}+0.0000857339$$
$$\left(48+\pi-0.0586299\sqrt{-1+\frac{2e}{\log(\pi)}}^{15}\left(\sum_{k=0}^{\infty}\left(\frac{\frac{1}{2}}{k}\right)\left(-1+\frac{2e}{\log(\pi)}\right)^{-k}\right)^{15}\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{4\,(5\,(0.2858+0.178))}\right)^{15}-11-\frac{\pi}{4}\right)-1\right)\right)^2+\frac{1}{2}=$$
$$\frac{1}{2}+0.0000857339\left(48+\pi-0.0586299\sqrt{\frac{2e}{\log(-1+\pi)-\sum_{k=1}^{\infty}\frac{(-1)^k(-1+\pi)^{-k}}{k}}}^{15}\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{4\,(5\,(0.2858+0.178))}\right)^{15}-11-\frac{\pi}{4}\right)-1\right)\right)^2+\frac{1}{2}=\frac{1}{2}+0.0000857339\left(48+\pi-0.0586299\sqrt{-1+\frac{2e}{\log(\pi)}}^{15}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-1+\frac{2e}{\log(\pi)}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^{15}\right)^2$$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

Integral representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{4\,(5\,(0.2858+0.178))}\right)^{15}-11-\frac{\pi}{4}\right)-1\right)\right)^2+\frac{1}{2}=\frac{1}{2}+0.0000857339\left(48+\pi-0.0586299\sqrt{\frac{2e}{\int_1^{\pi}\frac{1}{t}\,dt}}^{15}\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{7\sqrt{\frac{2e}{\log(\pi)}}}{4\,(5\,(0.2858+0.178))}\right)^{15}-11-\frac{\pi}{4}\right)-1\right)\right)^2+\frac{1}{2}=\frac{1}{2}+0.0000857339\left(48+\pi-0.0586299\sqrt{\frac{4e\,i\,\pi}{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{(-1+\pi)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}}^{15}\right)^2$$

for $-1<\gamma<0$

$\Gamma(x)$ is the gamma function

i is the imaginary unit

From the following Moon nodes values, with regard the New Moon, we have that:

New Moon 03°59'28

New Moon 06°46'07

New Moon 07°33'43

New Moon 11°50'40

New Moon 00°42'13

New Moon 19°32'36

New Moon 00°56'53

New Moon 00°46'35

New Moon 00°13'15

New Moon 21°25'36

New Moon 15°37'52

New Moon 09°01'57

New Moon 12°00'26

New Moon 18°21'12

New Moon 28°52'56

New Moon 05°08'20

New Moon 03°19'52

New Moon 04°56'43

New Moon 10°57'20

New Moon 09°26'14

New Moon 05°32'04

New Moon 24°58'51

New Moon 24°38'41

New Moon 24°30'51

New Moon 23°18'44

New Moon 04°12'16

New Moon 10°57'20

New Moon 09°26'14

New Moon 05°19'13

New Moon 12°09'16

New Moon 14°47'03

New Moon 28°06'53

New Moon 20°42'33

New Moon 13°11'21

New Moon 05°34'21

(03°59' + 06°46' + 07°33' + 11°50' + 00°42' + 19°32' + 00°56' + 00°46' + 00°13' + 21°25' + 15°37' + 09°01' + 12°00' +18°21' + 28°52' + 05°08' + 03°19' + 04°56' +10°57' + 09°26' + 05°32' + 24°58' + 24°38' + 24°30' + 23°18' + 04°12' +10°57' + 09°26' + 05°19' +12°09' + 14°47' + 28°06' + 20°42' + 13°11' + 05°34')

03.59° + 06.46° + 07.33° + 11.50° + 00.42° + 19.32° + 00.56° + 00.46° + 00.13° + 21.25°

Input interpretation

3.59° (degrees) + 6.46° (degrees) + 7.33° (degrees) +
11.5° (degrees) + 0.42° (degrees) + 19.32° (degrees) +
0.56° (degrees) + 0.46° (degrees) + 0.13° (degrees) + 21.25° (degrees)

Result

71.02° (degrees)

15.37° + 09.01° + 12.00° +18.21° + 28.52° + 05.08° + 03.19° + 04.56° +10.57° + 09.26°

Input interpretation

15.37° (degrees) + 9.01° (degrees) + 12.° (degrees) +
18.21° (degrees) + 28.52° (degrees) + 5.08° (degrees) +
3.19° (degrees) + 4.56° (degrees) + 10.57° (degrees) + 9.26° (degrees)

Result

115.77° (degrees)

05.32° + 24.58° + 24.38° + 24.30° + 23.18° + 04.12° +10.57° + 09.26° + 05.19° +12.09° + 14.47° + 28.06° + 20.42° + 13.11° + 05.34°

Input interpretation

5.32° (degrees) + 24.58° (degrees) + 24.38° (degrees) +
24.3° (degrees) + 23.18° (degrees) + 4.12° (degrees) + 10.57° (degrees) +
9.26° (degrees) + 5.19° (degrees) + 12.09° (degrees) + 14.47° (degrees) +
28.06° (degrees) + 20.42° (degrees) + 13.11° (degrees) + 5.34° (degrees)

Result

224.39° (degrees)

(71.02° + 115.77° + 224.39°)/35

Input interpretation

$$\frac{1}{35}\left(71.02^\circ \text{ (degrees)} + 115.77^\circ \text{ (degrees)} + 224.39^\circ \text{ (degrees)}\right)$$

Result

11.748° (degrees)

Unit conversions

205.04 mrad (milliradians)

0.20504 radians

---

11 degrees 44 arcminutes 53 arcseconds

46^{m} 59.5^{s} (right ascension)

13.053 grads
(unit officially deprecated)

Comparisons as angular elongation

≈ 0.26 × maximum elongation of Venus (45 to 47°)

≈ (0.4 to 0.6) × maximum elongation of Mercury (18 to 28°)

Interpretations

plane angle

angular elongation

Basic unit dimensions

[angle]

Corresponding quantities

Arc length s along the Earth's equator from $s = R\theta$:

1308 km (kilometers)

1.308×10^6 meters

706 nmi (nautical miles)

813 miles

Arc length s around the Earth at 45° latitude from $s = R\cos(45°)\theta$:

925 km (kilometers)

924 740 meters

499 nmi (nautical miles)

575 miles

Rotation count N from $N = \varphi/(2\pi)$:

0.033 rot (rotations)

Slope percentage from [slope percentage] $= 100\% \times \tan(\theta)$:

21 slope% (slope percent)

Electric loss factor d from $\delta = \tan^{-1}(d)$:

0.21

Quality factor Q from $\delta d = \tan^{-1}(1/Q)$:

4.8

$\tan^{-1}(x)$ is the inverse tangent function

With regard the Full Moon, we obtain:

Full Moon 18°58'45

Full Moon 22°30'59

Full Moon 23°35'20

Full Moon 26°54'50

Full Moon 14°18'45

Full Moon 12°35'26

Full Moon 03°17'30

Full Moon 21°45'09

Full Moon 18°00'12

Full Moon 21°12'55

Full Moon 09°04'06

Full Moon 08°31'03

Full Moon 07°53'33

Full Moon 18°43'38

Full Moon 00°57'31

Full Moon 24°37'51

Full Moon 20°57'11

Full Moon 23°58'58

Full Moon 26°50'10

Full Moon 29°04'29

(18.58° + 22.30° + 23.35° + 26.54° + 14.18° + 12.35° + 03.17° + 21.45° + 18.00° + 21.12°)

Input interpretation

18.58° (degrees) + 22.3° (degrees) + 23.35° (degrees) +
26.54° (degrees) + 14.18° (degrees) + 12.35° (degrees) +
3.17° (degrees) + 21.45° (degrees) + 18.° (degrees) + 21.12° (degrees)

Result

181.04° (degrees)

(09.04° + 08.31° + 07.53° + 18.43° + 00.57° + 24.37° + 20.57° + 23.58° + 26.50°+ 29.04°)

Input interpretation

9.04° (degrees) + 8.31° (degrees) + 7.53° (degrees) +
18.43° (degrees) + 0.57° (degrees) + 24.37° (degrees) +
20.57° (degrees) + 23.58° (degrees) + 26.5° (degrees) + 29.04° (degrees)

Result

167.94° (degrees)

(181.04°+167.94°)/20

Input interpretation

$\frac{1}{20}$ (181.04° (degrees) + 167.94° (degrees))

Result

17.449° (degrees)

Unit conversions

304.54 mrad (milliradians)

0.30454 radians

---

17 degrees 26 arcminutes 56 arcseconds

$1^{h}\ 9^{m}\ 47.8^{s}$ (right ascension)

19.388 grads
(unit officially deprecated)

Comparisons as angular elongation

≈ 0.38 × maximum elongation of Venus (45 to 47°)

≈ (0.6 to 0.9) × maximum elongation of Mercury (18 to 28°)

Interpretations

plane angle

angular elongation

Basic unit dimensions

[angle]

Corresponding quantities

Arc length s along the Earth's equator from $s = R\theta$:

1942 km (kilometers)

1.942×10^6 meters

1049 nmi (nautical miles)

1207 miles

Arc length s around the Earth at 45° latitude from $s = R\cos(45°)\theta$:

1373 km (kilometers)

1.373×10^6 meters

742 nmi (nautical miles)

853 miles

Rotation count N from $N = \varphi/(2\pi)$:

0.048 rot (rotations)

Slope percentage from [slope percentage] $= 100\% \times \tan(\theta)$:

31 slope% (slope percent)

Electric loss factor d from $\delta = \tan^{-1}(d)$:

0.31

Quality factor Q from $\delta d = \tan^{-1}(1/Q)$:

3.2

$\tan^{-1}(x)$ is the inverse tangent function

We have also, from the two previous results in radians:

1/12(Pi^2/(0.20504+0.30454))

Input

$$\frac{1}{12} \times \frac{\pi^2}{0.20504 + 0.30454}$$

Result

1.614009642105485337407683942311339916420336258494052393869027659 4
…

1.6140096421…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternative representations

$$\frac{\pi^2}{(0.20504 + 0.30454)\,12} = \frac{(180\,^\circ)^2}{0.50958 \times 12}$$

$$\frac{\pi^2}{(0.20504 + 0.30454)\,12} = \frac{(-i \log(-1))^2}{0.50958 \times 12}$$

$$\frac{\pi^2}{(0.20504 + 0.30454)\,12} = \frac{6\,\zeta(2)}{0.50958 \times 12}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\zeta(s)$ is the Riemann zeta function

Series representations

$$\frac{\pi^2}{(0.20504 + 0.30454)\,12} = 2.61653\left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2$$

$$\frac{\pi^2}{(0.20504 + 0.30454)\,12} = 0.654133\left(-1 + \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}\right)^2$$

$$\frac{\pi^2}{(0.20504 + 0.30454)\,12} = 0.163533\left(\sum_{k=0}^{\infty} \frac{2^{-k}\,(-6+50k)}{\binom{3k}{k}}\right)^2$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\frac{\pi^2}{(0.20504 + 0.30454)\,12} = 0.654133\left(\int_0^{\infty} \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{\pi^2}{(0.20504 + 0.30454)\,12} = 2.61653\left(\int_0^{1} \sqrt{1-t^2}\,dt\right)^2$$

$$\frac{\pi^2}{(0.20504 + 0.30454)\,12} = 0.654133\left(\int_0^{\infty} \frac{\sin(t)}{t}\,dt\right)^2$$

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

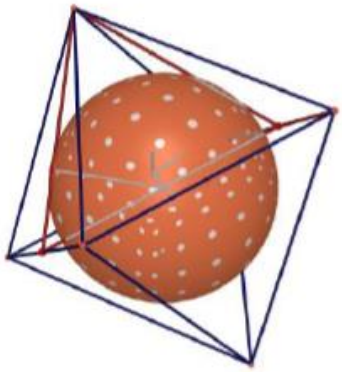


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\ l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.141939571526584308924330732196162632677513386811659044682541739 3

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

4096 = 64^2 , (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$).

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.61805\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^8\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^8\right)^k}{k!}\right)\quad\text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$
$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi e^0 \approx 3.1416$ (real, principal root)

$\pi e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1\sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003$ (real, principal root)

$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003$ (real root)

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\,\pi\left\lfloor\frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{8}{\pi^2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\,\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\,\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\,\sqrt{2}\,a^3}{\frac{4}{3}\,\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\,\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.6180085459001070581002623979536005212943435960226956084921288971

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left((\sqrt{2}\,a^3)(\sqrt{2}\,d^3)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\frac{\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)^3}{3\times 3}}}} = \sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} = \sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} = \sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\mathrm{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13

…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\Big/\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}(C\times \mathrm{R}\times 2.33\cdot 10^{-13})}}\cong 1.61803398\ldots=\frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.618035912348264235440174408834709854254527350840173356306481810 7

…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\, x^2\, y\, z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$) is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.6018401361\times 10^{-24}\right)}}$$

1.618032997307532491506757016629746746422577260892967140791939590 3
…

1.6180329973075… result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.4525642121\times 10^{-24}\right)}}$$

Result

1.644932352102092130483898983704151168876621841655166877914166033 8
…

1.64493235210209213…≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

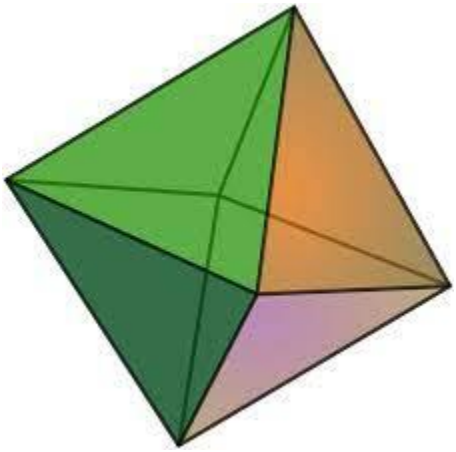
Result

3.14159225731469939939950039231605796469731171781644423955790024797

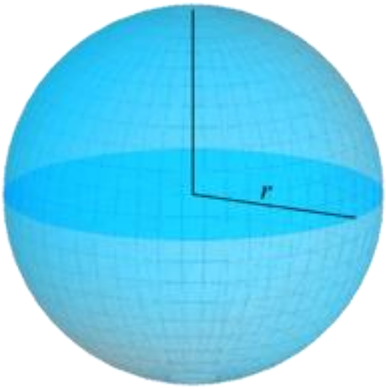
…

3.14159225731469…≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find *a*, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

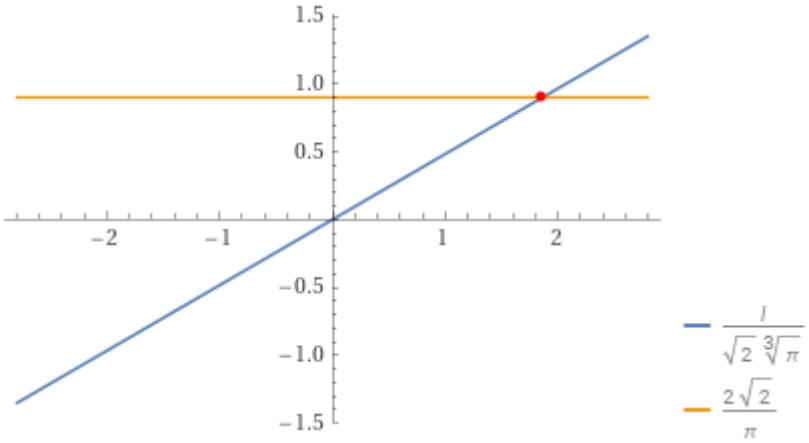
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32 \cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}};\ a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **$f_0(1710)$ scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256x^8 + 95\,744x^7 - 3\,248\,750\,080x^6 - 914\,210\,725\,504x^5 + 15\,498\,355\,554\,921\,184x^4 + 2\,911\,478\,392\,539\,914\,656x^3 - 32\,941\,144\,911\,224\,677\,091\,680x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not}\ (z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

1.64381856858…. $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\wedge(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-\right.\right.\right.\right.$$
$$\left.\left.\left.\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\right/\right.\right.$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\wedge(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-\right.\right.\right.\right.$$
$$\left.\left.\left.\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\right/\right.\right.$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\wedge(1/15)\right)$$
for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\operatorname{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

$-5.010882647757...$

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $b=-\frac{226\,802\,245}{18\,480\,874}$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

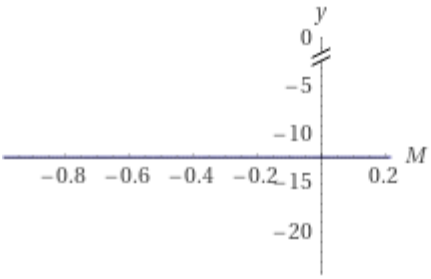
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

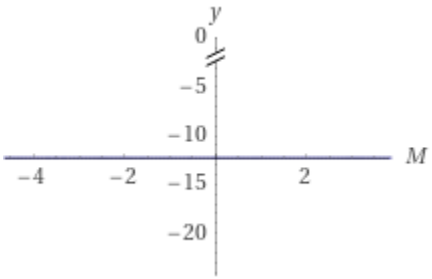
Result:

$$\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

−12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty} \frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2} = -12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty \left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2} - -12.2723\right) dM = 0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V = \frac{1}{3}\,(0.0814845\,b+1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

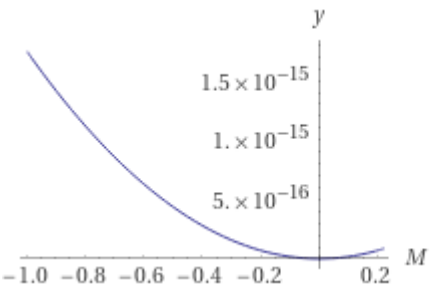
Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

Result:

0

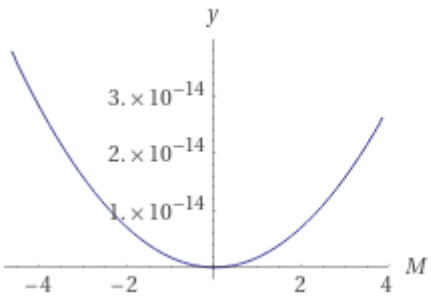
Plots: **(possible mathematical connection with an open string)**



(*M* from −1 to 0.2)

M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$$O\left(M^{62194}\right)$$

(Taylor series)

Series expansion at M = ∞:

$$1.75541\times10^{-15}\,M^2+O\left(\left(\frac{1}{M}\right)^{62194}\right)$$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{1}{3}\,M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2\left(-0.5^2\right)$$

Result:

$$-4.38851344947464545348970783378088020833333333333333333333\ldots \times 10^{-16}$$

-4.38851344947*10^-16

For M = 0.2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\,M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 0.2^2 + 6.58545 \times 10^{-10}\sqrt{0.2^4}\right)}{0.2^2} + 1\right)^2 \times 0.2^2$$

Result:

$$7.02162151915943272558353253404940833333333333333333333333\ldots \times 10^{-17}$$

7.021621519159*10^-17

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875\times10^{-14}$

$1.57986484181*10^{-14}$

For M = 2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times 2^2+6.58545\times 10^{-10}\sqrt{2^4}\right)}{2^2}+1\right)^2\times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times 10^{-15}$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots \times 10^{-8}$

$5.9776991059*10^{-8}$ result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^{2} = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

We note that:

1/55*(([[((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\ \hat{}\ (1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\ \sqrt[4]{3}\ e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

$1.6181818182\ldots$

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

$5.729475 * 10^{-35}$ Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

$1.820306 * 10^{61}$ V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

$5.975498*10^{-8}$ V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

$1.042940*10^{27}$ V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

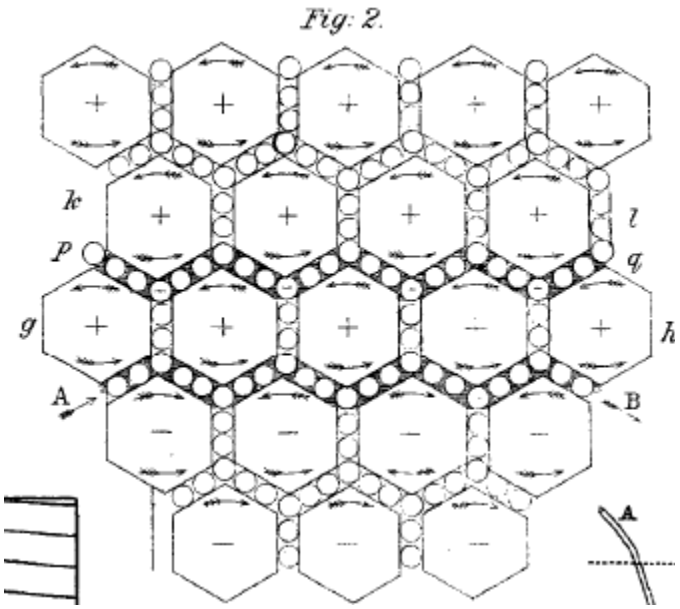
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

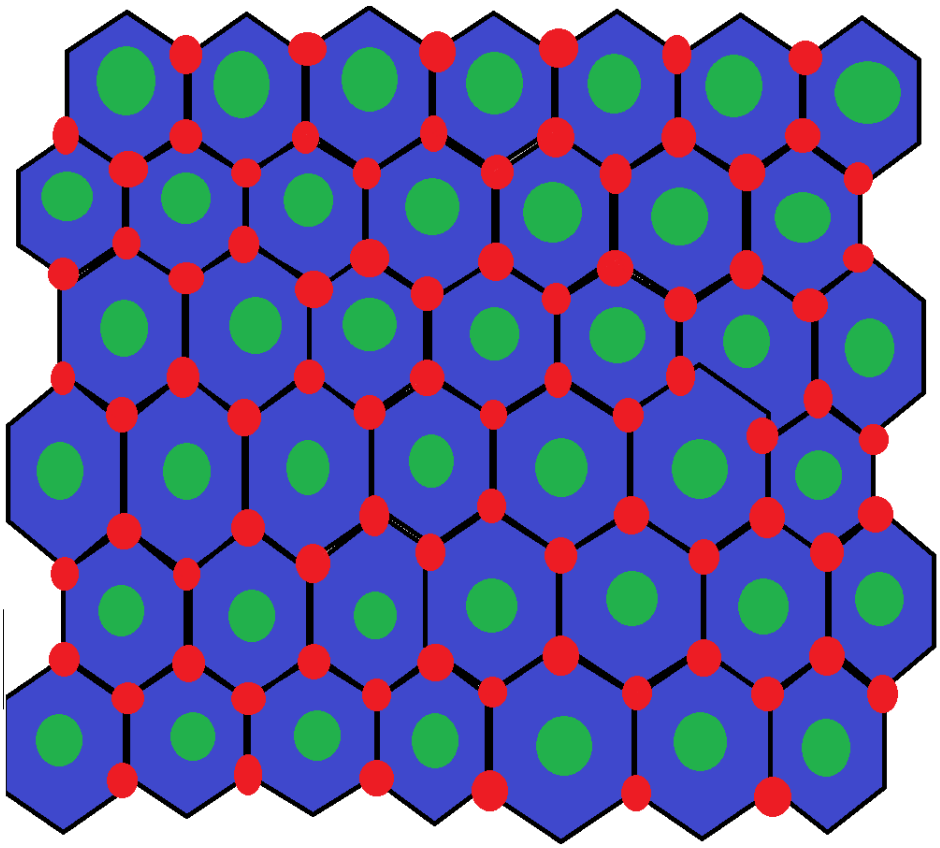
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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SULLE SORGIVE TERMALI DEL PORTO D'ISCHIA

Di Giulio Grablovitz

Eclisse Solare del 6 Giugno 1891 – Nota del *Prof. Giulio Grablovitz*

A Number Theoretic Analysis of the Enthalpy, Enthalpy Energy Density, Thermodynamic Volume, and the Equation of State of a Modified White Hole, and the Implications to the Quantum Vacuum Spacetime, Matter Creation and the Planck Frequency. - *Nardelli, M., Kubeka, A.S. and Amani, A.* (2024) - Journal of Modern Physics , 15, 1-50. - https://doi.org/10.4236/jmp.2024.151001

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

An Update on Brane Supersymmetry Breaking - *Jihad Mourad and Augusto Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On the study of various earthquakes, geophysical phenomena and related equations. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory III

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper, (part III) we analyze various earthquakes, geophysical phenomena and related equations. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory

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Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico

(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

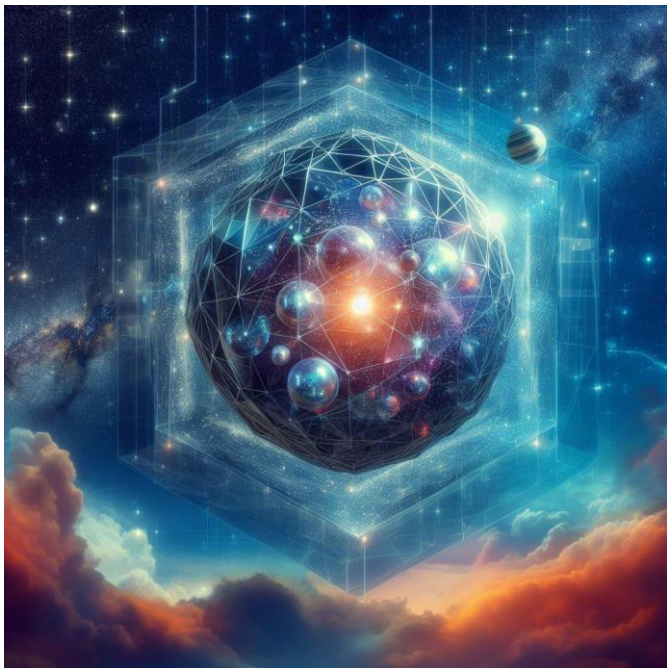
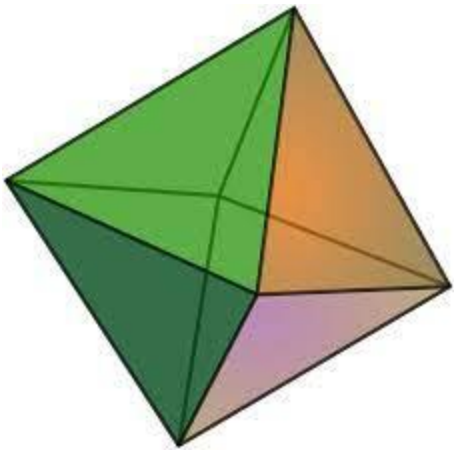
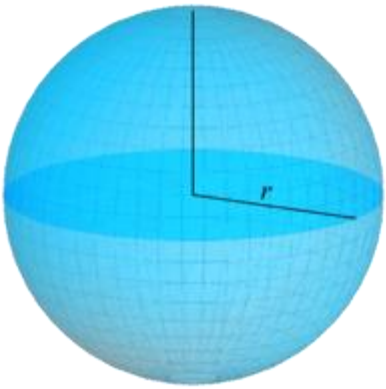


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\,\pi\,x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$$l = 0\,, \quad x = 0$$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi\,x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi\,x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

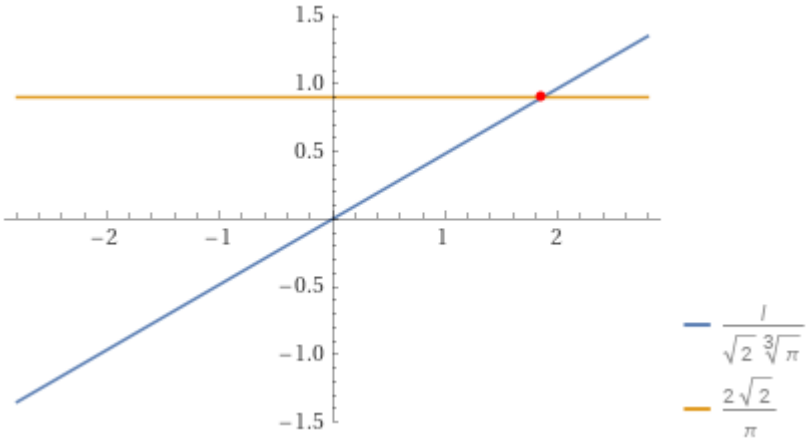
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

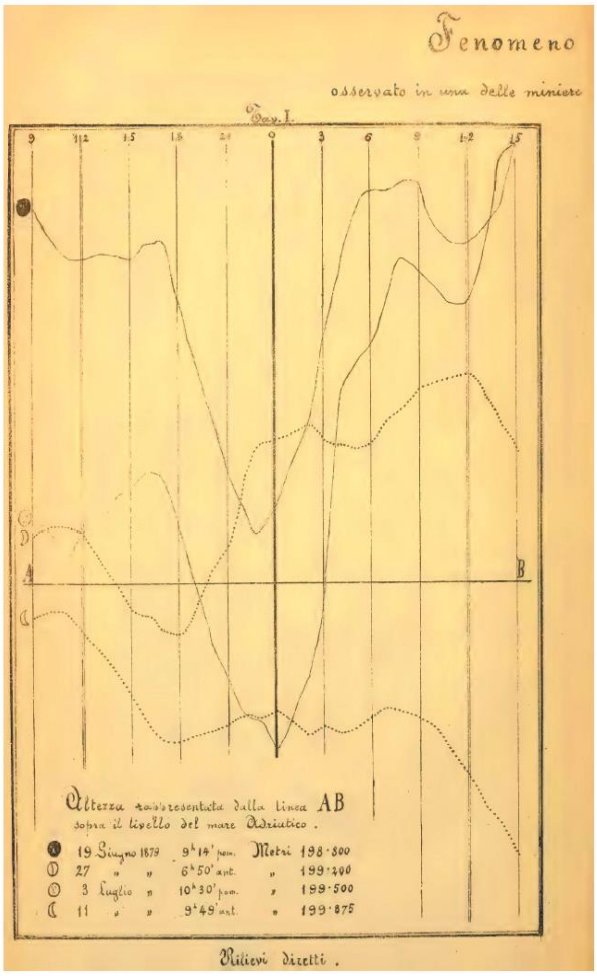
Plot



Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
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11 " " 9h 49' ant. " 199·875
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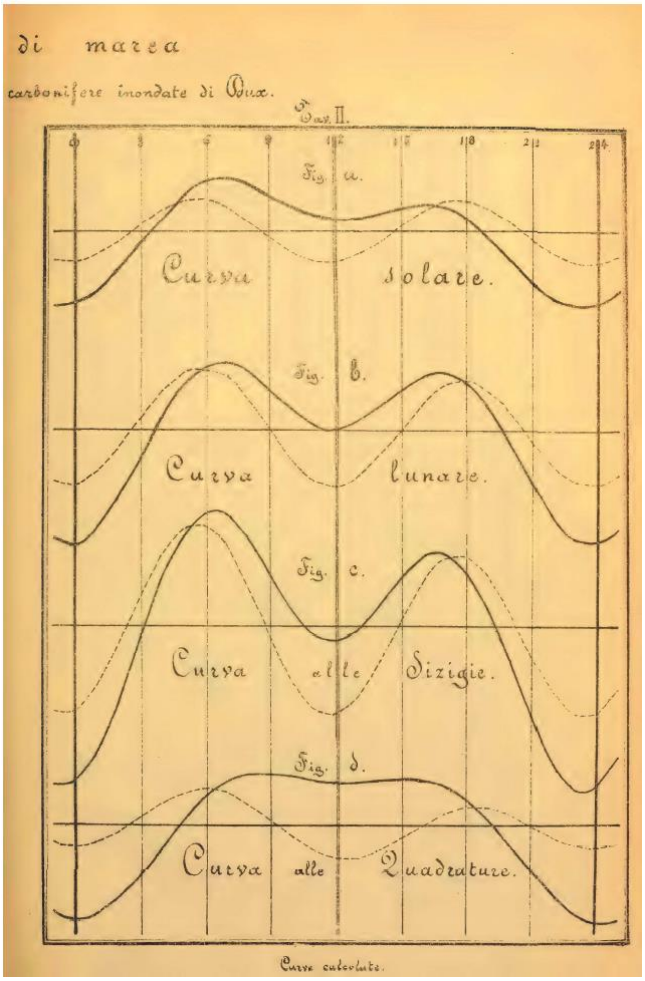
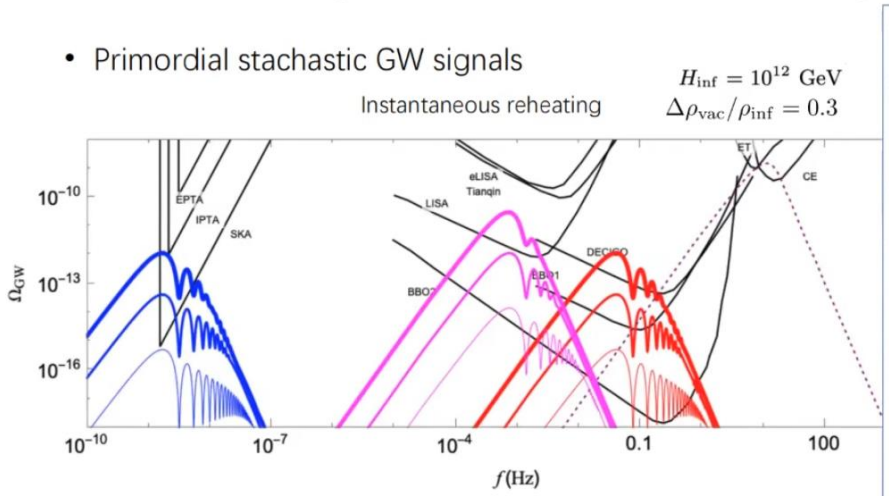

di marea
carbonifere inondate di Pux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

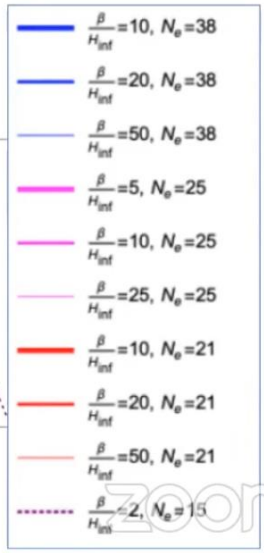
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

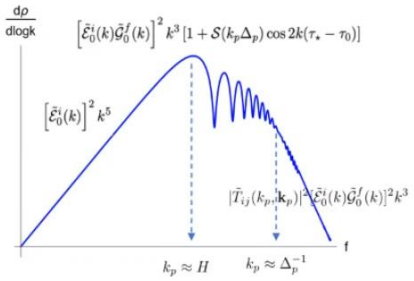
Comparison between primary GW and secondary GW

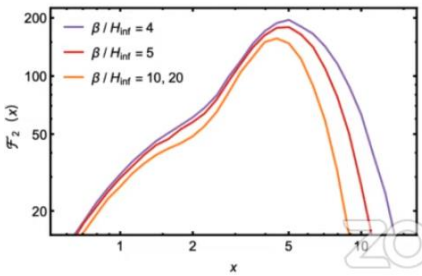
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





Observations on some seismic events 1873, 1878, 1880-1881 and 1885

Observations on the Earthquake of March 12, 1873 in Central Italy

Ragusa (Dalmazia) – Salisburgo – Aosta - Cosenza

Il fenomeno è passato. Ma quale ne fu la causa, quali le leggi, quali i precedenti, quali le conseguenze, quale l' ordine delle scosse, quali le influenze sugli animali? E poichè una scienza dei terremoti digià esiste, trova essa la scienza sismologica nel terremoto del 12 marzo 1873 nessun fenomeno che disveli nuove leggi o nuove qualità delle forze interiori del nostro pianeta, o che porti a sospettare nuove reciproche influenze tra le forze interne e le esterne atmosferiche o cosmiche? Quanti problemi in un solo fenomeno! Di tutti cercheremo la soluzione certa o probabile.

Adunque dove scoppiò la gran mina che la sera del 12 Marzo fe' traballare l' immenso quadrilatero che ha per suoi vertici Ragusa, Salisburgo, Aosta, Cosenza? E se non fu un' esplosione vulcanica nelle viscere del globo, ma piuttosto una bufera o marea d' irrequieti vapori o bollenti lave (terribili furie che abitano l' interno del nostro pianeta), dove percosse in prima quella bufera o marea?

On the Central Italy earthquake of 03.12.1873

« Sono circa le 9 di sera del giorno 12 marzo; un rombo si sente romoreggiare non sotterra, ma piuttosto per l'aria. Quest'urlo precursore fu sentito in qualche luogo anche dall'interno delle case, ma meglio e più forte fu avvertito nella campagna... Ché cosa è che lo produce? di dove viene? di sotterra od è nell'aria? A ciò il dotto P. Serpieri non risponde; e pensa che fosse nell'aria libera... Possiamo ammettere quale assioma, che il rombo, quando rombo v'è, è solito preannunciare l'arrivo imminente di un terremoto e talvolta si sente anche quando ha fatta la sua strage. »

« Questo rumore non era ancora cessato, che ad un tratto, appena battute le 9 di sera, una forte scossa smuoveva tutta quanta l'Italia da Cosenza a Belluno. Dove nacque quel terremoto? Come si estese? Ecco i quesiti a cui egregiamente rispose il chiarissimo P. Serpieri nel suo rapporto

penisola, e quindi venuta di fuori. Egli osserva inoltre che questa stessa onda si è spinta molto innanzi a tramontana ed a mezzogiorno, cioè ad Aosta e Cosenza; mentre il moto perpendicolare al primo corse verso le due spiagge marine, ma non discese e non salì molto nelle latitudini e con una bella figura rappresenta il terremoto come un grande e precipitoso fiume che ha corso da Cosenza ad Aosta o viceversa, e in mille punti ha rotto gli argini spingendosi con forti correnti a destra ed a sinistra ».

« Dalle notizie dall'egregio professore raccolte anzitutto appare che i moti geosismici hanno cominciato a manifestarsi sulla riva orientale dell'Adriatico, e che l'ora media del terremoto da Ragusa a Venezia (tempo di Roma) fu 9 ore 3′ 1/5, mentre le stazioni della penisola, tranne alcune centrali da Firenze a Spoleto hanno tutte un'ora superiore alle 9 ore 4′; ed inoltre i tempi vanno via alzandosi col crescere della latitudine. Difatti l'ora media in cui il terremoto si è fatto sentire nelle località seguenti, distanti l'una dall'altra circa un grado di latitudine è stata per

Ragusa-Sebenico	lat. med.	43°	19	ore	9, 0′ 2/5
Zara-Pola	»	44°	29	»	9, 2′ 1/5
Pisino-Trieste	»	45°	25	»	9, 5′ 3/10

« La progressione, scrive quindi il P. Serpieri, viene anche troppo bella e parlante. In poco più che 2′ le onde passarono dal grado 43 al 44 e nell'istesso tempo corsero dal grado 44 al 45. »

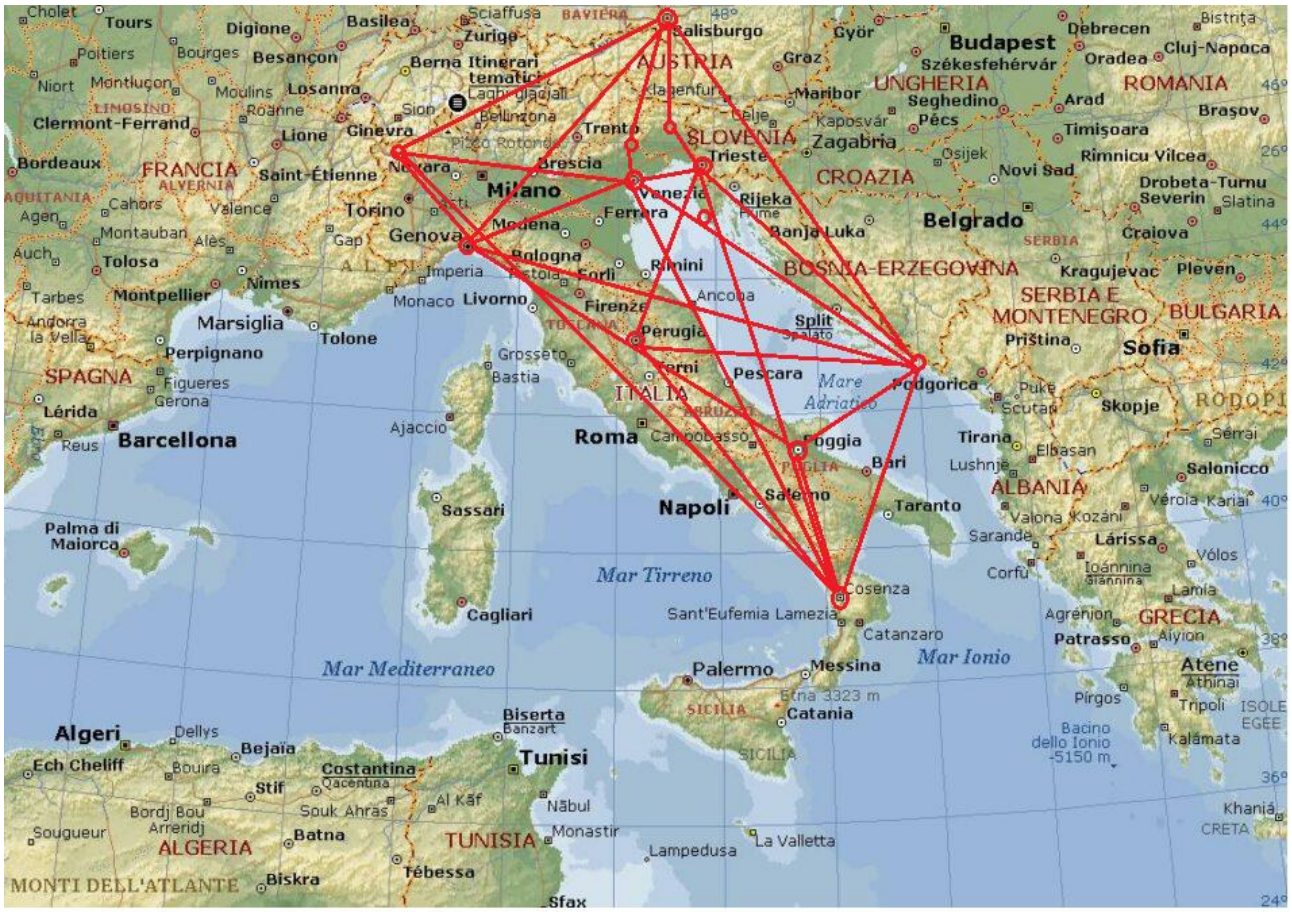
« Se si considera che le prime scosse si fecero sentire a Ragusa a ore 8.56 ½, a Cosenza, a Todi, a Foligno, a Zara alle ore 9, a Perugia alle ore 9 1', a Firenze a ore 9 3' 5/6, mentre nel resto d'Italia si manifestarono ad ora più tarda e nella valle della Salza l'ondulazione apparve a ore 9 22' ½, subito si ravvisa che il movimento nacque realmente verso il centro della Penisola. « Alle origini del Tevere da Fi-

le cento braccia a scuotere con moto convulso ambedue i lidi da Foggia a Venezia, da Cosenza a Genova, e le lontane creste delle Alpi. A tanta potenza e vastità di origine non poteva non corrispondere largo, lontanissimo effetto. »

« Prendendo di mira le stazioni di Ragusa e Venezia, e poi quelle di Spoleto e Venezia, egli calcolò la distanza sopra un arco di circolo massimo della terra, ed ebbe per le prime due 299 miglia o 554 chilometri, e per le seconde 209 miglia o 387 chilometri. La prima distanza percorsa in

« Le altre freccie laterali pure azzurre, segnano le linee d'irraggiamento, e queste, confermando il principio generale, rappresentano veramente i fatti parziali. In un colpo d'occhio si vede come la stessa scossa siasi fatta sentire a Cosenza e ad Aosta, e la freccia lassù sopra Udine, segna la scossa che probabilmente per quella direzione andò fino a Salisburgo e si fece sentire a ore 9, 22′ ½ tempo di Roma. »

« Infine nell'Adriatico abbiamo fatto un fascio di freccie con a fianco un punto interrogativo, volendo con questo segnale indicare il supposto punto di provenienza della corrente sdoppiatasi verso l'Italia e verso Dalmazia. »



Salisburgo - Ragusa (Dalmazia) – Aosta – Belluno - Udine – Venezia – Trieste - Pola – Genova – Perugia - Foggia – Cosenza

We note therefore that the earthquake in central Italy of March 12, 1873 was felt from the South (Cosenza, Calabria) to the North (Udine, Friuli-Venezia Giulia) of our peninsula, up to Austria (Salzburg)

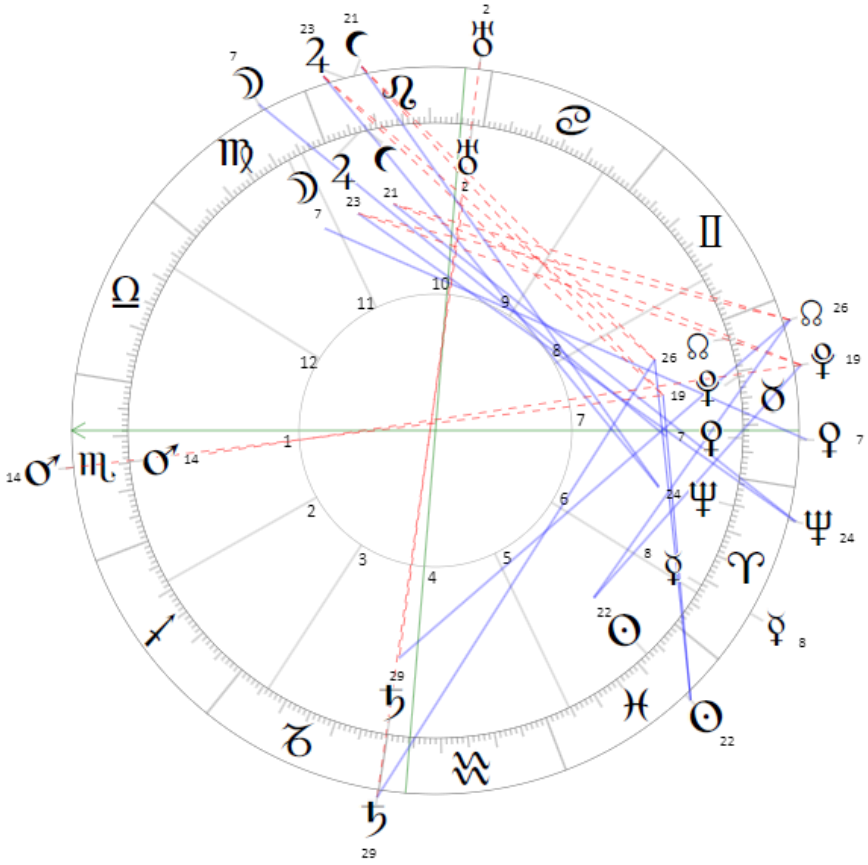
Friday, March 14, 1873 05:44:38 Full Moon 23°44'34 403 114.74 km

March 19, 1873 earthquake 7.3 R S. Salvador

March 14, 1873 05:44:38 Full Moon 23°44'34 403114.74 km

March 21, 1873 22:19:38 Last quarter 01°22'57 375835.01 km

Transit sky of Wednesday **12 March 1873** at 21:04:00, Rome, Italy



Nodo lunare – Plutone – Venere – Nettuno – Sole – Mercurio – Saturno – Luna – Giove – Luna – Urano – Marte

Giove-Nettuno; Nettuno-Luna; Saturno-Urano; Luna-Giove-Venere-Nettuno

02/02/1878	9.29	Eclisse anulare.	Meridionale	7.22	17.26

27 January 1880 10:12:16 Full Moon 06°54'44 392030.34 km

Regarding the earthquake of 01.26.1878, we have that:

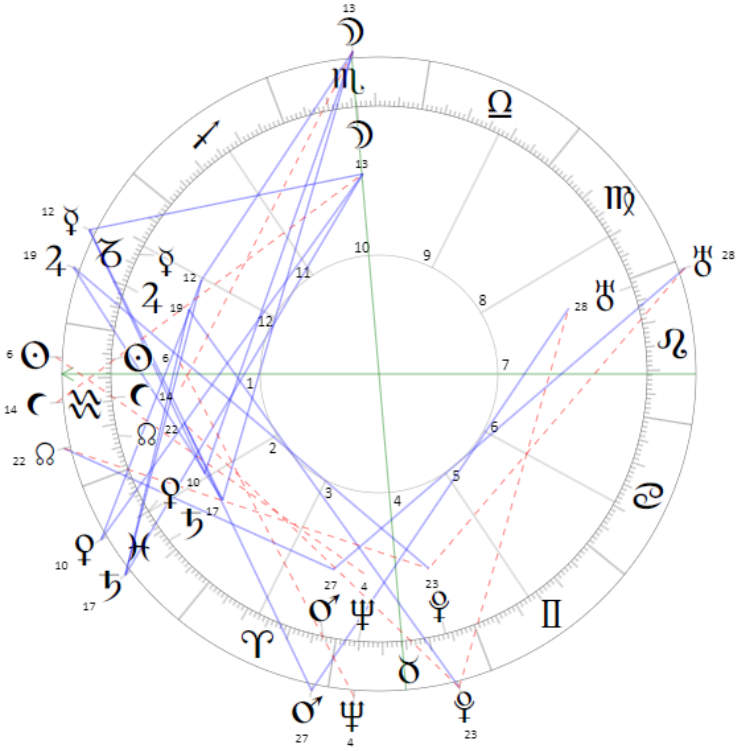
Nel giorno 26 gennaio 1878, alle ore 6, 25 ant. fu avvertito a Lisbona un terremoto preceduto da rombo sotterraneo. La scossa ebbe due impulsi successivi con oscillazioni da E ad O. Durò circa tre secondi. Non furono osservati spostamenti di mobili, ma la maggior parte degli abitanti avvertirono uno scricchiolio nelle impalcature. Ciò av-

Lunedì 28 gennaio 1878, leggere scosse furono avvertite a Rouen, Havre, Caen e lungo tutto il littorale della Manica. Il fenomeno fu sentito anche a Tarbes negli Alti Pirenei, e a Thionville nell'Alsazia.

A Caen il terremoto fu debolmente sentito verso le 11, 45′ a. m. nella direzione di E-O, sola direzione che potè disturbare un orologio a pendolo ed arrestarne il moto. Niun danno ne è avvenuto: tremarono i vetri e i quadri sospesi, ed un provino posato verticalmente cadde rovesciato. È la terza volta che questo fenomeno si fa sentire da 25 anni. Il primo avvenne violentissimo verso il 1859, e il secondo dodici anni fa.

Ho letto quest'oggi col più vivo interesse le notizie che Ella ha pubblicato sui terremoti del 26 e 28 Gennaio, che han scosso il Portogallo, la Francia e l'Inghilterra. Son lieto di farle conoscere, che anche in Italia abbiamo avuto nello stesso periodo un massimo straordinario nelle nostre osservazioni microsismiche; il quale massimo, secondo la legge divenuta già quasi costante, precede i veri sensibili terremoti. Difatti il 25 e il 26 la grande burrasca atmosferica è stata accompagnata qui in Italia da piccole scosse; e queste appunto hanno preceduto il terremoto, che si è manifestato due giorni dopo nella Manica; mentre l'Italia era allora tornata nella più completa tranquillità.

Transit sky of Saturday 26 January 1878 at 06:25:00, Rome, Italy



Luna – Venere; Luna – Giove ; Mercutio – Marte;

09.01.1878 Earth-Sun-Jupiter Conjunction

January 25, 1878 15:49:41 Last quarter 05°36'35 376140.57 km

February 2, 1878 08:17:15 New Moon 13°24'54 403046.19 km

Regarding the eclipses of 1880, we have:

11/01/1880	23.36	Eclisse totale.	Settentrionale	7.37	16.59
07/07/1880	14.10	Eclisse anulare.	Meridionale	4.42	19.47
02/12/1880	4.13	Eclisse parziale. Magnitud. = 0,03	Meridionale	7.20	16.40
31/12/1880	14.42	Eclisse parziale. Magnitud. = 0,71	Settentrionale	7.38	16.49

1880-07-04 08:20 Vallese, Embd

07/07/1880	14.10	Eclisse anulare.	Meridionale	4.42	19.47

7 July 1880 13:21:29 New Moon 15°43'26 404175.72 km

1880-12-01 10 Mistretta Mw = 4.16

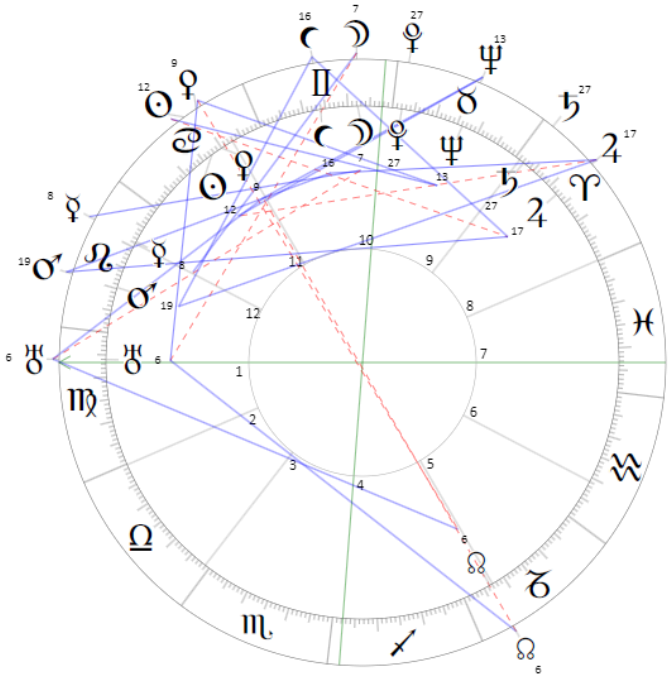
02/12/1880	4.13	Eclisse parziale. Magnitud. = 0,03	Meridionale	7.20	16.40

2 December 1880 02:56:37 New Moon 10°21'56 359428.83 km

(Perigee)

We also have that:

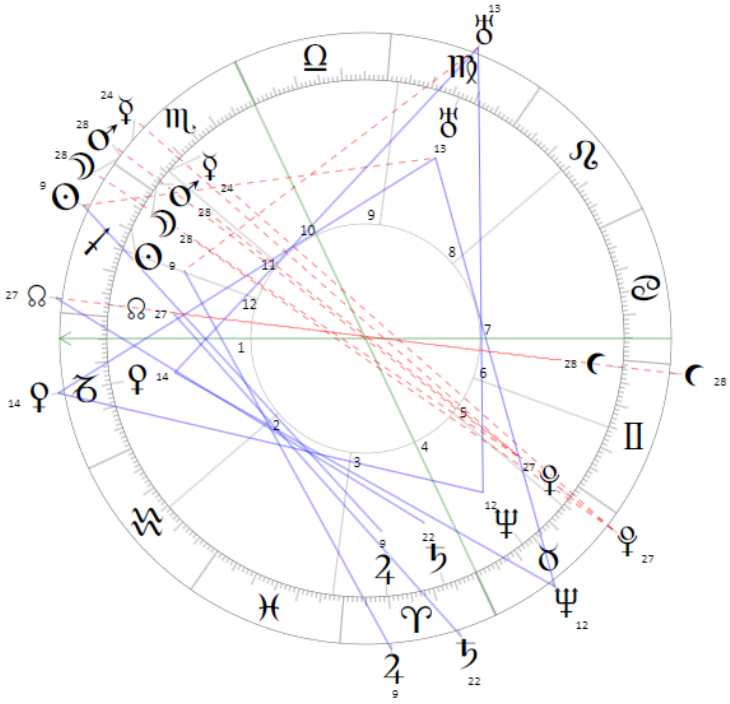
Transit sky of **Sunday 4 July 1880** at 08:20:00, Rome, Italy



Urano-Nettuno; Marte-Nettuno; Urano-Luna; Mercurio-Giove; Nettuno-Luna

Urano-Nettuno-Luna

Transit sky of **Wednesday 1 December 1880** at 08:20:00, Rome, Italy



Luna-Marte-Mercurio -- Plutone

Urano-Nettuno; Urano-Venere; Sole – Giove ; Sole-Saturno;

Sole-Giove-Saturno

28/05/1881	0.51	Eclisse parziale. Magnitud. = 0,73	Settentrionale	4.39	19.35

21/11/1881	17.27	Eclisse anulare.	Meridionale	7.07	16.45

1881-01-24 16:14	Bolognese

30 January 1881 00:48:23 New Moon 10°19'44 359023.06 km

1881-02-12 02:30 Etna - Codavolpe (S. Venerina)

14 February 1881 06:23:54 Full Moon 25°45'08 400516.98 km

1881-03-04 12:05 Casamicciola

28 February 1881 11:32:36 New Moon 10°03'30 365797.97 km

1881-04-23 04:12 Paola

28 April 1881 10:24:45 New Moon 08°14'36 386678.20 km

1881-06-09 Basso Vallese

12 June 1881 06:56:47 Full Moon 21°23'25 362063.98 km

1881-07-22	02:45	Belledonne-Pelvoux

26 Jul 1881 05:19:21 New Moon 03°18'15 406581.25 km

1881-08-03	14:42	Alessandrino
1881-08-05		Belledonne-Pelvoux

9 August 1881 21:07:07 Full Moon 17°20'25 357400.90 km

1881-09-10	07	Chietino

8 September 1881 04:39:47 Full Moon 15°38'25 361473.12 km

1881-09-21	21:20	Tarentaise (Moutiers)
1881-09-28		Cesena
1881-11-05	08:42	Carinthia, Gmuend
1881-11-14	02:55	Montreux
1881-11-25	17:25	Vaud, Aigle
1881-12-04	04:27	Sion

1881-12-17	05:14	Bex
1881-12-28	02	St. Moritz

September 23, 1881	11:54:48	New Moon	00°34'30	397300.47 km
November 6, 1881	02:03:17	Full Moon	13°49'52	380012.05 km
November 13, 1881	23:01:27	Last quarter	21°45'01	404240.24 km
November 21, 1881	16:21:36	New Moon	29°32'50	375651.69 km
December 5, 1881	17:13:56	Full Moon	13°46'23	391336.87 km
January 4, 1882	10:58:48	Full Moon	14°03'17	400790.06 km

The Moon is the closest celestial body to the Earth. Its average distance is 384,400 km. During a lunation, the Earth-Moon distance varies by about 45 thousand km. Furthermore, the maximum (apogee) and minimum (perigee) distances do not remain constant but vary according to non-simple rules. There are many gravitational perturbations that influence the motion of our satellite, consequently it is difficult to predict the real measurements of the apogee and perigee. When the major axis of the lunar orbit is perpendicular to the Earth-Moon line, the difference between the perigee and the apogee is reduced. The minimum Earth-Moon distance will be reached on January 1, 2257 and the minimum on January 7, 2266.

Below are the main data relating to the Earth-Moon distances.

Average apogee 405503 Km

maximum 406720 Km

Average perigee 363296 Km

minimum 356371 Km

Even if it doesn't seem like it, the Earth and the Moon are a binary system, that is, they rotate around each other. The center of gravity of this system is 17 Km below the Earth's surfaces.

Microseismic observations – 1885 earthquakes

OSS. MICROSISM. 1885 Gennajo Decade I.	1	2	3	4	5	6	7	8	9	10	Media	N.d'Os.	Media mensile	N. d'Oss.
Spinea di Mestre	2.37	1.55	1.65	0.72	0.31	1.24	1.13	2.06	1.03	0.00	1.20	40		
Venezia	—	—	—	—	—	—	—	—	—	—	—	—		
Verona	0.09	0.74	0.53	0.97	0.80	0.97	1.06	1.33	0.59	0.97	0.80	46		
Piacenza	0.61	2.05	1.28	0.46	0.77	1.08	0.81	1.34	0.66	0.77	0.98	30		
Moncalieri	1.31	1.36	1.02	1.81	1.86	1.83	1.53	2.11	1.10	0.84	1.17	118		
Alessandria	0.68	2.00	1.32	0.53	0.65	1.08	0.86	1.15	0.55	0.43	0.92	48		
Parma	0.86	1.13	1.05	0.66	0.58	0.58	0.74	2.60	0.69	0.41	0.93	50		
Bologna-S. Luca	1.77	1.35	2.36	0.58	0.67	0.67	0.89	1.09	1.08	0.84	1.08	40		
Chiavari	0.17	2.60	4.44	0.37	0.00	0.49	0.14	1.76	0.37	0.09	0.74	78		
S. Gio: in Galilea	1.40	1.10	2.71	1.92	0.87	1.61	1.53	1.58	1.07	0.33	1.41	71		
Pesaro	6.05	6.47	9.57	2.67	1.68	6.83	5.77	4.62	8.80	0.42	5.18	60		
Firenze t. a.	0.93	2.89	4.19	1.83	1.63	2.43	1.00	3.80	0.73	0.47	1.99	66		
Firenze t. n.	0.81	0.77	1.27	0.71	0.47	0.67	0.55	2.06	0.32	0.50	0 81	66		
Livorno	—	—	—	—	—	—	—	—	—	—	—	—		
Fermo	2.21	2.30	5.68	3.46	6.47	7.63	4.17	2.13	4.37	0.00	3.84	20		
Perugia	1.78	1.78	2.97	2.07	1.18	2.37	2.52	1.48	1.18	0.59	1.79	40		
M. Fortino	4.29	2.87	0.00	2.87	5.74	1.92	1.43	0.00	0.00	1.92	2.10	23		
Spoleto	—	—	—	—	—	—	—	—	—	—	—	—		
Narni	1.69	2.3	1 24	1.69	4.14	1.29	3.63	0.64	0.64	1.49	1.87	32		
Viterbo	0.00	0.53	1.41	1.32	1.58	1.41	0.70	0.53	0.70	0.00	0.81	25		
Aquila	1.11	1.41	1.93	2 43	2.36	4.14	2.48	1.61	1.48	0.41	1.93	50		
Roma	0.58	0.86	1.35	1.20	0.99	1.02	0.93	0.54	0.75	0.22	0.84	72		
Rocca di Papa	2.94	5.79	3.61	4.39	3.17	3.50	4.54	2.18	2.52	1.26	3.39	65		
Velletri	0.84	1.80	2.28	1.41	1.56	1.56	1.44	1.08	1.08	0.48	1.35	331		
Ceccano	0.00	2.93	0.00	0.00	0.87	1.05	0.00	0.00	0.0	0.00	0.48	28		
Foggia	0.77	1.71	1.07	2.27	2.23	2.10	1.71	3.34	1.71	0.34	1.73	40		
Pozzuoli	1.37	3.19	1.67	0.76	0 60	2.12	0.76	0.76	0.60	0.45	1.22	40		
Lecce	—	—	—	—	—	—	—	—	—	—	—	—		
Corleone	1.45	2.41	2.66	1.69	2.90	1.93	2.42	1.69	2.17	2.17	2.14	30		
Acireale	—	—	—	—	—	—	—	—	—	—	—	—		
Catania	0.96	4.23	6.22	5.07	1.94	7.93	1.58	1.02	1.03	1.03	3.09	57		
Med. microsism.	1.42	2.23	2.32	1.68	1.77	2.26	1.70	1.63	1.33	0.61	1.69.	1566		
Numero di scosse	4	3	3	3	4	3	3	2	3	4	Tot. delle sc. 32			
Intens. massima.	5°	4°	3°	1°	4°	1°	2°	3°	1°	1°				

Decade I.ª Incominciando dunque dalla 1.ª decade del Gennaio 1885 non si può non ricordare che in quel periodo ferveva l'attività endogena nell'Andalusia. Di quel periodo ho avuto già più volte occasione di ragionare specialmente nell'Annuario Meteorologico della Società Met. Ital. (Anno I, pag. 168) e vi ho mostrato la connessione continuata delle burrasche sismiche d'ambedue le regioni, tanto che ho chiamato quel periodo Italo-iberico. I moti microsismici furono piuttosto notevoli sempre ed accompagnarono con costante precedenza i massimi sismici che avvennero nei giorni 1, 5 ed 8. La pressione barometrica sempre alta non parve perturbare l'andamento geodinamico.

January 5, 1885 (seismic maximum)

1885-01-05 06 Queyras (Guillestre - Piemonte) M = 4 - 4.19

1 January 1885 05:26:14 Full Moon 11°02'05 357385.29 km

(Perigee)

OSS. MICROSISM. 1885 Gennajo Decade III.	21	22	23	24	25	26	27	28	29	30	31	Media	N.d'Os.	Media mensile	N. d'Oss.
Spinea di Mestre	1. 54	2. 17	1. 34	2. 37	1. 86	0. 41	1. 44	0. 00	0. 00	0. 00	0. 93	1. 09	44		
Venezia	4. 88	4. 11	4. 54	7. 75	2. 51	3. 36	5. 06	1. 28	0. 60	1. 80	2. 97	3. 50	55		
Verona	0. 48	0. 38	0. 19	2. 62	0. 32	1. 76	0. 09	0. 34	0. 09	0. 06	0. 48	0. 61	43		
Piacenza	1. 50	0. 92	1. 03	1. 04	1. 39	0. 97	0. 77	0. 61	0. 66	1. 23	1. 70	1. 07	33		
Moncalieri	1. 18	2. 34	1. 35	1. 24	2. 24	1. 85	1. 42	1. 85	1. 59	1. 67	1. 25	1. 68	132		
Alessandria	0. 24	0. 38	0. 26	0. 45	1. 27	1. 44	0. 31	0. 48	0. 55	1. 49	2. 55	0. 85	55		
Parma	1. 92	0. 70	1. 03	0. 59	2. 11	1. 40	1. 37	0. 82	1. 02	0. 82	2. 16	1. 26	53		
Bologna - S. Luca	2. 02	2. 19	0. 00	2. 95	1. 89	0. 67	1. 01	0. 78	1. 77	0. 56	0. 50	1. 30	41		
Chiavari	0. 27	0. 14	0. 00	0. 39	1. 31	1. 04	0. 00	0. 14	0. 02	0. 76	2. 76	0. 62	61		
S. Gio: in Galilea	1. 51	2. 64	2. 30	2 32	0. 80	1. 53	1. 75	0. 62	0. 25	0. 21	0. 45	1. 30	65		
Pesaro	2. 89	10.41	7. 46	11.40	1. 40	2. 95	6. 75	0. 98	0. 00	0. 00	0. 42	4. 01	06		
Firenze t. a	0. 67	2. 30	1. 76	2. 21	2. 72	1. 96	1. 76	2. 39	1. 14	1. 96	4. 13	2. 09	74		
Firenze t. n	0. 81	0. 51	1. 22	1. 22	1. 22	1. 11	1. 42	1. 01	0. 41	1. 62	2. 64	1. 19	74		
Livorno	—	—	—	—	—	—	—	—	—	—	—	—	—		
Fermo	3. 56	3. 85	3. 46	4. 41	0. 00	2. 11	0. 75	0. 00	0. 00	0. 00	0. 00	1. 64	22		
Perugia	1. 78	2. 97	2. 37	2. 37	1. 04	2. 08	1. 93	1. 04	0. 59	0. 59	0. 74	1. 59	44		
M. Fortino	5. 44	3. 84	0. 00	4. 29	0. 00	0. 00	0. 00	0. 00	0. 95	0. 00	2. 14	1. 46	27		
Spoleto	—	—	—	—	—	—	—	—	—	—	—	—	—		
Narni	3. 18	1. 88	3. 58	1. 48	2. 93	0. 74	3. 38	1. 88	0. 59	2. 18	1. 29	2. 10	33		
Viterbo	1. 05	1. 05	0. 17	0. 88	0. 17	1. 32	1. 23	0. 53	0. 00	0. 00	1. 23	0. 69	31		
Aquila	2. 49	4. 47	2. 90	3. 32	1. 07	1. 54	1. 43	1. 15	0. 45	0. 11	0. 45	1. 76	55		
Roma	1. 38	0. 64	0. 91	1. 74	1. 18	1. 82	1. 25	1. 08	0. 28	0. 38	1. 29	1. 07	96		
Rocca di Papa	3. 51	1. 78	1. 68	4. 46	3. 36	2. 38	3. 17	3. 10	1. 08	0. 84	2. 88	3. 02	89		
Velletri	1. 83	0. 90	1. 80	2. 72	2. 07	2. 00	1. 56	1. 25	0. 37	0. 14	1. 33	1. 40	364		
Ceccano	0. 00	0. 21	0. 00	—	0. 29	0. 00	0. 00	0. 00	0. 00	0. 00	—	0. 05	34		
Foggia	2. 78	1. 67	3. 46	1. 97	1. 16	1. 88	2. 66	0. 86	1. 12	0. 34	0. 04	1. 63	44		
Pozzuoli	1. 21	0. 91	0. 91	1. 06	0. 60	3. 34	2. 43	0. 60	0. 60	0. 00	0. 00	1. 06	44		
Lecce	—	—	—	—	—	—	—	—	—	—	—	—	—		
Corleone	1. 45	1. 93	2. 90	3. 38	2. 65	1. 45	1. 93	1. 45	1. 93	0. 72	0. 72	1. 86	83		
Acireale	—	—	—	—	—	—	—	—	—	—	—	—	—		
Catania	0. 90	2. 79	1. 07	0. 7	5. 61	3. 37	2. 25	1. 16	1. 06	0. 60	0. 41	2. 27	76		
Med. microsism.	2. 03	2. 13	1. 74	2. 66	1. 59	1. 83	1. 74	0. 94	0. 64	0. 66	1. 35	1. 56	1790		
Numero di scosse	10	4	4	14	19	16	9	6	1	2	6	Totale sc. 100			
Intens. massima.	1°	3°	1°	6°	1°	1°	1°	1°	1°	2°	3°				

done i massimi nel 12, 14, 17, 19 e 20 tutte date quasi decadicamente corrispondenti ai massimi della 1.ª decade.

Decade III. I centri di depressione barometrica si fanno sentire sull'Italia nei giorni 21, 23 e 26 coincidendo coll'agitazione microsismica assai notevole. La quale alla sua volta pure accompagnava e precedeva in massimi sismici ossia i terremoti che non forti ma vieppiù numerosi in questa decade ascesero alla totale cifra del centinaio. I loro maggiori gruppi apparvero ai 21-22, ai 24-28, 31 nuovamente, cioè con distanze approssimativamente decadiche dai precedenti.

M. S. DE ROSSI.

22-23-24 January 1885 (seismic maximum)

1885-01-24 20 Liguria occidentale Mw = 4.40

January 24, 1885	01:26:09	First quarter	04°17'28	375892.94 km
January 30, 1885	16:19:10	Full Moon	11°00'50	362859.31 km
		(Perigee)		

OSS. MICROSISM. 1885 Febbrajo Decade III.	21	22	23	24	25	26	27	28	Media	N.d'Os.	Media mensile	N. d'Oss.
Spinea di Mestre	0. 41	1. 33	0. 71	0. 71	0. 61	0. 00	0. 51	0. 00	0. 53	32		
Venezia	1. 44	4. 59	0. 90	0. 64	0. 64	0. 96	0. 74	0. 74	1. 33	40		
Verona	0. 19	0. 97	0. 43	0. 40	0. 48	0. 48	0. 34	3. 03	0. 79	45		
Piacenza	0. 97	1. 03	1. 08	0. 92	1. 59	0. 92	1. 19	1. 28	1. 12	24		
Moncalieri	1. 53	1. 71	0. 94	1. 79	1. 39	2. 41	1. 48	1. 55	1. 80	96		
Alessandria	0. 93	0. 72	0. 43	0. 36	1. 15	0. 77	0. 45	0. 65	0. 68	40		
Parma	0. 81	0. 86	0. 53	0. 37	0. 29	0. 29	0. 33	0. 41	0. 48	41		
Bologna-S. Luca	0. 33	1. 01	0. 92	0. 50	1. 26	0. 67	0. 00	0. 22	0. 61	29		
Chiavari	0. 59	0. 37	0. 62	0. 04	0. 04	2. 76	0. 00	0. 19	0. 57	46		
S. Gio: in Galilea	0. 77	0. 60	0. 47	0. 53	0. 57	0. 75	0. 28	0. 23	0. 42	51		
Pesaro	0. 56	1. 12	0. 42	0. 28	0. 42	0. 42	0. 14	0. 00	0. 42	48		
Firenze t. a.	1. 43	1. 19	0. 54	0. 35	0. 89	4. 66	0. 07	0. 27	1. 17	64		
Firenze t. n.	1. 13	1. 28	0. 61	0. 65	0. 96	8. 25	0. 30	0. 61	1. 09	64		
Livorno	—	—	—	—	—	—	—	—	—	—		
Fermo	0. 00	0. 00	0. 00	0. 00	0. 00	0. 00	0. 00	0. 38	0. 04	16		
Perugia	0. 59	1. 33	0. 89	1. 64	0. 89	1. 04	0. 59	0. 59	0. 87	32		
M. Fortino	5. 01	0. 95	2. 87	0. 00	2. 52	0. 00	0. 00	2. 14	1. 69	20		
Spoleto	—	—	—	—	—	—	—	—	—	—		
Narni	0. 64	0. 99	3. 18	0. 69	1. 83	1. 14	2. 33	1. 14	1. 32	24		
Viterbo	0. 39	0. 53	0. 17	0. 00	0. 00	0. 66	0. 00	0. 00	0. 21	29		
Aquila	1. 09	1. 43	0. 59	1. 36	1. 57	0. 41	0. 61	0. 48	0. 94	40		
Roma	0. 66	0. 89	0. 37	0. 35	0. 44	1. 16	0. 43	0. 28	0. 54	44		
Rocca di Papa	2. 28	1. 96	1. 51	1. 99	1. 68	1. 32	1. 44	1. 47	1. 70	50		
Velletri	0. 55	0. 76	0. 93	0. 59	0. 36	0. 43	0. 33	0. 37	0. 54	266		
Ceccano	—	0. 00	0. 00	0. 29	0. 00	0. 00	0. 00	0. 29	0. 82	19		
Foggia	0. 86	1. 12	1. 25	1. 50	1. 12	1. 16	0. 34	0. 17	0. 94	32		
Pozzuoli	0. 30	0. 60	0. 76	1. 06	0. 60	0. 60	1. 21	5. 47	1. 32	32		
Lecce	—	—	—	—	—	—	—	—	—	—		
Corleone	1. 45	0. 96	0. 72	1. 45	1. 93	1. 45	1. 93	0. 96	1. 35	23		
Acireale	—	—	—	—	—	—	—	—	—	—		
Catania	0. 69	1. 13	0. 92	0. 78	0. 88	0. 68	0. 99	0. 99	0. 87	41		
Med. microsism.	0. 98	1. 08	0. 84	0. 69	0. 89	1. 05	0. 59	0. 88	0. 88	1288		
Numero di scosse	6	2	1	2	2	4		10	Tot. delle sc.	31		
Intens. massima	3°	2°	2°	2°	1°	6°	3°	3°				

rona. Così i due massimi sismici di questa decade conservaronsi alla medesima distanza periodica dei precedenti corrispondendo quello del 21 all'anteriore del 10, e quello del 26 all'altro del 16.

M. S. DE ROSSI

February 21-26, 1885 (seismic maximum)

1885-02-26	20:48	Pianura Padana	Mw = 5.01

February 21, 1885 Jupiter opposition

March 1, 1885 04:00:14 Full Moon 10°46'29 372102.89 km

OSS. MICROSISM. 1885 Decembre Decade III.	21	22	23	24	25	26	27	28	29	30	31	Media	N.d'Os.	Media mensile	N. d'Os.
Spinea di Mestre	0. 00	0. 20	0. 00	2. 06	1. 14	0. 56	1. 85	0. 30	0. 10	2. 79	2. 29	1. 02	44		
Venezia	0. 26	0. 00	0. 21	1. 06	0. 53	1. 06	0. 53	0. 53	0. 53	2. 40	0. 26	0. 67	66		
Verona	—	—	—	—	—	—	—	—	—	—	—	—	—		
Piacenza	1. 34	1. 28	0. 81	0. 61	1. 12	0. 72	0. 88	1. 62	1. 59	0. 97	0. 81	1. 05	32		
Moncalieri	0. 54	1. 47	1. 41	2. 31	1. 67	1. 77	2. 62	2. 15	2. 01	2. 68	1. 98	1. 87	125		
Alessandria	0. 46	1. 10	0. 70	1. 44	0. 78	0. 62	1. 35	0. 70	0. 76	1 34	1. 23	0. 94	61		
Parma	0. 45	2. 16	0. 66	3 21	3. 06	0. 62	2. 36	0. 58	2. 12	3. 63	2. 92	1. 98	55		
Bologna - S. Luca	0. 00	0 99	0. 16	1. 01	1. 53	0. 84	1. 51	0. 94	0. 00	2. 03	0. 78	0. 89	46		
Chiavari	—	—	—	—	—	—	—	—	—	—	—	—	—		
S. Gio: in Galilea	0. 06	0. 12	0. 12	0. 62	1. 14	0. 42	0. 55	0. 23	0. 08	1. 48	1. 02	0. 53	66		
Pesaro	0. 30	0. 15	0. 00	1. 07	1. 99	0. 76	2. 60	1. 07	0. 00	3. 67	3. 37	1. 36	66		
Firenze t. n	3. 45	3. 34	3. 34	3. 45	3. 34	0. 89	2. 63	0. 20	1. 26	4. 40	3. 50	2. 66	74		
Firenze t. a	1. 03	3. 14	3. 14	1. 03	3. 14	1. 52	0. 81	0. 51	1. 68	2. 90	2. 70	1. 96	74		
Livorno	—	—	—	—	—	—	—	—	—	—	—	—	—		
Fermo	0. 00	0. 00	0. 00	0. 00	6. 65	0. 96	0. 00	0. 00	0. 00	0. 00	4. 95	1. 14	21		
Perugia	0. 59	0. 89	0. 59	0. 59	1. 63	0. 59	1. 48	0. 89	0. 74	2. 67	5. 20	1. 44	44		
M. Fortino	—	0. 00	0. 00	0. 00	1. 43	0. 52	0. 95	0. 47	0. 00	2. 87	1. 91	0. 81	26		
Spoleto	0. 00	0. 00	0. 00	0. 00	2. 42	1. 81	0. 00	2. 42	0. 00	1. 81	2. 42	0. 98	19		
Narni	0 49	0. 34	0. 00	0. 00	0. 99	0. 99	1. 49	1. 49	0. 00	0. 49	1. 74	0. 73	33		
Viterbo	0. 00	1. 05	0. 00	1. 32	1. 05	0. 35	1. 10	0. 53	0 35	0 53	1. 85	0. 74	31		
Aquila	0. 19	0. 46	0. 54	0. 56	4. 04	0. 73	1. 96	1. 57	0. 80	3. 02	3. 00	1. 53	53		
Roma	0. 53	1. 71	0. 88	2. 52	3. 09	0. 93	2. 71	1. 53	1. 26	2. 75	4. 23	2. 01	106		
Rocca di Papa	0. 00	0. 84	0. 84	1. 30	3. 17	0. 84	0. 98	1. 78	0. 92	1. 91	3. 49	1. 46	107		
Velletri	0. 17	1. 22	0. 70	1. 45	2. 38	1. 01	2. 04	1. 15	1. 65	2. 73	3. 83	1. 67	366		
Ceccano	—	—	—	—	—	—	—	—	—	—	—	—	—		
Foggia	0. 21	0. 56	0. 00	0. 00	1. 25	1. 29	1. 71	2. 49	0. 90	1. 58	3. 46	1. 22	44		
Benevento	0. 11	0. 13	0. 22	0. 22	0. 89	0. 56	1. 17	0. 61	0. 55	1. 08	1. 67	0. 65	33		
Pozzuoli	0. 60	0. 60	1. 21	0. 60	6. 08	3. 65	5. 48	6. 69	3. 65	7. 61	7. 30	3. 95	44		
Lecce	0. 40	0. 00	0. 00	0. 00	0. 35	2. 61	3. 22	1. 91	2. 82	2. 51	3. 62	1. 58	33		
Corleone	1. 93	1. 45	1. 69	1. 45	1. 69	1. 21	0. 72	1. 45	1. 93	1. 69	2. 66	1. 62	33		
Acireale	0. 86	0. 15	0. 10	0. 08	1. 32	0. 54	0. 36	1. 02	0. 71	0. 56	1. 08	0. 57	44		
Catania	0. 56	0. 82	0. 32	0. 36	5. 71	1. 52	1. 27	1. 49	1. 28	1. 20	6. 29	1. 89	74		
Med. microsism.	0. 52	0. 86	0. 63	1. 01	2. 26	1. 04	1. 58	1. 29	0. 98	2. 26	2. 84	1. 39	1820		
Numero di scosse	1	1	2	7	3	6	3	2	4	6	10	Totale sc.	45		
Intens. massima.	1	1	1	6	2	9	1	1	7	1	3				

Decade III.ª L'attività microsismica in questa decade tende ad un relativo riposo, manifestando minori i suoi massimi sempre però nella 2ª metà del periodo e col favore barometrico nei soli giorni di maggiore movimento cioè nel 25, 30 e 31. I terremoti furono molti di numero e di forza continuatamente dal 24 al 31 specialmente nel 24, 26, 29, 31. Fu la Basilicata nel 24 e 26 che sopportò gli urti maggiori; la Toscana nel 25; il Veneto nel 29; l'Umbria, il Lazio, e Benevento nel 30 e 31.

24-25 30-31 December (seismic maximum)

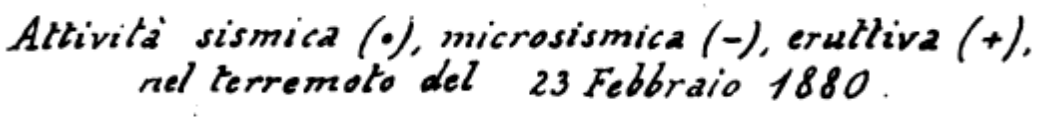
1885-12-24 10:50	Basilicata
1885-12-25 22:45	
1885-12-26 02	Molise
1885-12-26 03	La Gretagna (Basilicata)
1885-12-29	Alpago Cansiglio (Veneto)

December 21, 1885 20:58:34 Full Moon 00°14'03 360297.18 km

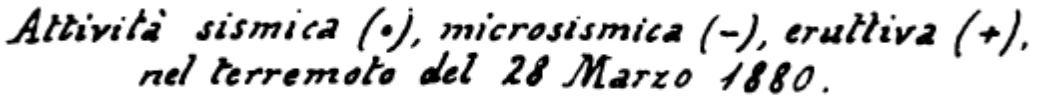
(Perigee)

January 5, 1886 07:43:45 New Moon 14°57'35 404999.84 km

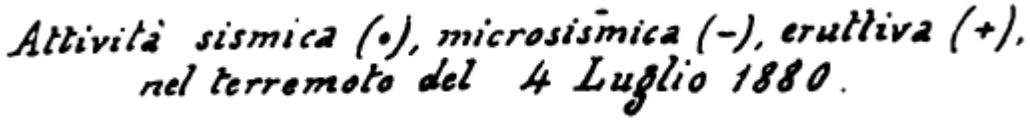
Some seismic events in the years 1880-1881

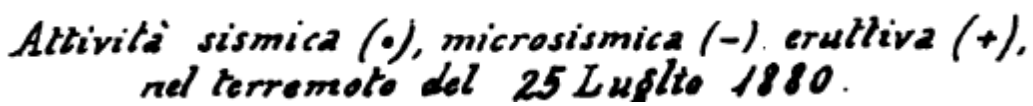


26 February 1880 01:21:57 Full Moon 06°52'03 380821.68 km



March 26, 1880 13:23:38 Full Moon 06°16'43 370160.23 km

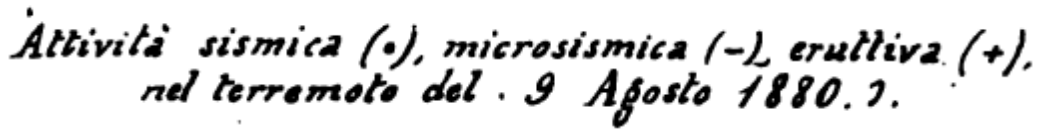




07/07/1880	14.10	Eclisse anulare.	Meridionale	4.42	19.47

July 7, 1880 13:21:29 New Moon 15°43'26 404175.72 km

July 21, 1880 21:02:26 Full Moon 29°23'06 361641.58 km



6 August 1880 03:48:30 New Moon 14°00'11 397385.59 km

Decade III.	21	22	23	24	25	26	27	28	29	30		Media	N.d'Os.
Bologna	1.37	2.12	2.30	0.48	0.69	1.88	1.87	1.36	1.06	0.69		1.33	66
Rimini	0.00	0.42	0.00	o. oo	0.00	1.13	2.12	3.25	1.13	0.00		0.80	20
Firenze t. a	2.33	2.98	1.87	0.34	0.53	0.81	1.46	1.36	0.22	0.30		1.22	110
Firenze t. n	1.41	2.68	1.56	0.59	0.54	1.52	3.30	1.48	0.70	0.54		1.41	110
Livorno	3.85	6.50	6.74	1.92	0.72	4.33	3.85	0.96	1.44	0.48		3.07	19
Fermo	0.34	0.49	0.94	0 31	0.25	0.30	3.03	3.08	1.63	1.15		1.15	31
M. Fortino	0.00	0.61	0.48	0.00	0.48	0.71	0.92	1.43	0.42	0.00		0.50	26
Narni	4 82	4.08	1.26	0.05	0.00	0.25	0.56	0.00	0.74	0.54		1.23	36
Viterbo	0.53	0.66	0.35	1.05	1.05	1.05	1.98	0.52	0.66	0.52		0.83	34
Roma	0.85	1.43	1.46	0.88	0.45	0.80	1.82	2.46	1.55	0.98		1.26	94
Rocca di Papa	0.00	1.68	0.00	0.00	3.37	—	0.00	--	0.00	0.00		0.63	20
Velletri	1.38	2.12	1.76	1.05	0.43	1.19	2.27	1.74	3.01	2.20		1.72	294
Ceccano	0.00	0.00	0.00	0.00	0.00	0.00	1.46	5.27	0.00	0.00		0.67	35
Foggia	1.71	2.14	2.40	0.81	0.21	0.77	0.47	2.06	2.44	2.74		1.57	40
Corleone	1.63	0.90	2.35	1.63	1.44	1.44	1.69	0.72	0.48	1.44		1.37	38
Med. gen. diurna	1.34	1.92	1.56	0.60	0.67	1.15	1.78	1.83	1.03	0.77		1.26	973
1881 MAGGIO Decade I.	1	2	3	4	5	6	7	8	9	10			
Bologna	1.24	0 85	1.30	1.18	2.07	1.59	0.91	0.43	1.77	1.99		1.33	69
Rimini	0.00	0.00	0.00	0.00	o. oo	o. oo	o. oo	1.98	2 97	1.98		0.69	20
Firenze t. a	0.10	1.32	2.84	0.91	0.22	0.10	0.10	0.22	0.12	0.41		0.63	99
Firenze t n	0.54	1.39	2.11	1.19	0.87	0.65	0.45	0.13	0.80	2.00		1.00	99
Livorno	1.44	4.62	4.33	3.37	1.44	0 72	0.48	0.00	0.48	7.23		2.41	19
Fermo	0.18	0.42	0.87	0.73	0.56	1.00	0.57	0.23	0.21	1.92		0.66	25
M. Fortino	o.oo	0.95	1.52	0.47	1.07	0.00	0.95	0.00	0.00	1.67		0.66	25
Narni	0.54	3.46	1.11	0.29	1.35	1.04	0.22	0.45	0.64	1.12		1.02	33
Viterbo	0.00	0.70	1.05	—	1.26	1.45	0.35	0.74	0.00	0.95		0.72	29
Roma	0.16	0.57	1.58	1.08	0.24	0.28	0.58	0.28	0.22	1.82		0.67	88
Rocca di Papa	3.37	3.22	1.26	0.00	0.00	0.00	3.53	0.42	0.00	0.00		1.18	32
Velletri	0.45	1.05	1.20	1.39	0.58	0.47	0.45	0.32	0.33	2.36		0.86	323
Ceccano	0.00	—	1.09	0.87	0.43	—	0.43	0.00	0.00	0.87		0.46	18
Foggia	0.17	1.25	1.12	1.07	0.47	0.17	1.88	0.81	1.37	2.01		1.03	40
Corleone	1.63	1.08	1.81	0.36	1.27	0.18	1.63	1.81	1 63	1.81		1.32	40
Med. gen. diurna	0.65	1.49	1.54	0.92	1.78	0.54	0.83	0.52	0.70	1.87		1.08	959
Decade II.	11	12	13	14	15	16	17	18	19	20			
Bologna	0.92	0 75	0.37	0.95	2.00	0.55	0.87	0.69	0.58	0.31		0.79	63
Rimini	o. oo	0.00	0 00	o. oo	1.69	0.56	0.00	0.00	o. oo	o. oo		0.22	20
Firenze t. a	0.30	0 34	0.22	0.06	0.16	0.06	0.49	0.12	0.00	0.12		0.18	98
Firenze t. n	0.83	0.33	0.54	0 54	0.43	0.24	1.74	0.54	0.00	0.17		0 52	98
Livorno	0.72	1.20	0 96	2.41	0.60	0.24	2.65	0.48	0.24	0.24		0.97	20
Fermo	0.89	0.13	0.25	o. 38	0.26	0.03	0.17	0.76	0.07	0.05		0.30	20
M. Fortino	2.95	0.71	0.00	0.95	0.00	5.30	0.00	0.01	0 35	0.71		1.10	24
Narni	0.79	0.39	2.13	2.28	0.52	1.63	1.59	1.24	0.00	0.09		1.06	28
Viterbo	0.26	0.66	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00		0.12	33
Roma	1.20	0.40	0.45	0.50	0 40	0.14	0.31	0.40	0.16	0.40		0.43	77
Rocca di Papa	0.00	3.79	1.68	o. oo	0.00	2.80	0.42	—	—	—		1.24	25
Velletri	1.50	0.35	1.24	1.21	0.78	0.53	0.48	0.79	0.63	0.54		0.80	329
Ceccano	1.31	0.00	0.00	3.51	0.00	0.00	0.00	3.51	0.00	0.00		0.83	21
Foggia	0.17	0.91	0.81	1.07	0.94	0.17	0.29	1.84	3.21	1.12		0.98	40
Corleone	0.72	0.90	1.63	1.16	0.90	0.90	1.81	2.17	1.27	0.72		1.21	40
Med. gen. diurna	0.83	0.67	0.68	1.00	0.57	0.87	0.74	0.89	0.46	0.32		0.71	936
Decade III.	21	22	23	24	25	26	27	28	29	30	31		
Bologna	0.37	0.31	1.06	0.69	0.37	0.37	0.75	0.37	0.69	0.87	0.75	0.60	67
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22
Firenze t. a	0.12	0.20	0.12	0.36	0.08	0.04	0.12	0.20	0.18	0.16	0.06	0.14	105
Firenze t. n	0.04	0.20	0.43	0.33	0.22	0.29	0.65	0.61	0.47	0.39	0.17	0.33	105
Livorno	0 12	0.48	0.36	1.08	0.48	0.24	1.80	1.03	0.96	0.79	0.96	0.75	21
Fermo	0.01	0.05	0.57	—	0.07	0.11	0.30	0.19	0.46	0.15	0.19	0.21	14
M. Fortino	1.19	1.43	4.58	0.51	2.86	1.48	0.71	0.95	1.43	0.71	0.00	1.44	27

April 23, 1881 6.74 (Microseismic maximum)

1881-04-23	04:12	Paola

28 April 1881 10:24:45 New Moon 08°14'36 386678.20 km

Narni	0.14	0.29	2.98	0.79	0.39	1.04	1.59	0.09	0.00	2.23	0.54	0.91	29
Viterbo	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	32
Roma	0.50	0.25	0.08	0.37	0.30	0.58	0.65	0.47	0.54	0.47	0.37	0.41	84
Rocca di Papa	0.00	2.80	0.84	0.84	3.03	0.00	0.00	0.00	0.81	0.00	0.00	0.76	30
Velletri	0.59	0.29	0.34	0.51	0.45	0.11	0.89	0.61	0.72	0.42	0.42	0.49	355
Ceccano	0.00	0.58	0.58	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.50	0.16	61
Foggia	0.17	0.86	1.29	0.43	0.00	0.34	0.81	0.51	0.17	0.43	0.90	0.55	44
Corleone	0.72	1.63	1.63	1.27	1.81	1.99	1.08	0.72	1.27	1.08	1.99	1.38	44
Med. gen. diurna	0.28	0.62	0.98	0.51	0.67	0.43	0.62	0.39	0.51	0.51	0.45	0.59	1040
1881 GIUGNO Decade I.	1	2	3	4	5	6	7	8	9	10		Media	N.°Os
Bologna	0.37	0.61	0.37	1.18	0.84	2.19	1.92	2.10	1.73	0.75		1.20	62
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.04	0.02	0.06	0.16	0.04	0.32	2.47	2.84	1.52	0.59		0.79	107
Firenze t. n.	0.02	0.20	0.15	0.89	0.31	1.41	2.51	3.29	1.72	0.89		1.09	107
Livorno	0.24	0.36	0.48	0.00	0.84	2.23	7.95	5.06	2.41	0.96		2.05	19
Fermo	0.00	0.00	0.00	0.19	0.07	1.08	0.77	1.02	0.65	0.53		0.43	18
M. Fortino	3.82	2.39	5.31	4.29	3.82	4.29	3.82	10.77	0.00	0.00		3.85	25
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.70	0.88	2.11	0.88	0.53		0.51	28
Roma	0.38	0.41	0.36	0.45	0.20	0.50	1.67	2.06	1.34	0.87		0.82	88
Rocca di Papa	2.24	0.30	0.42	2.73	1.96	0.42	—	3.08	1.54	1.68		1.56	33
Velletri	0.32	0.28	0.35	0.51	0.34	1.82	2.54	2.57	1.02	0.54		1.03	333
Ceccano	0.00	0.00	0.21	0.00	0.58	1.23	2.05	2.41	3.95	0.00		1.04	48
Foggia	0.94	0.12	0.17	0.12	0.12	0.60	2.10	1.97	2.49	0.81		0.94	40
Corleone	0.36	0.72	1.08	1.81	0.36	1.27	1.27	1.44	1.81	0.54		1.06	40
Med. gen. diurna	0.67	0.39	0.68	0.91	0.72	1.39	2.49	3.13	1.62	0.66		1.26	950
Decade II.	11	12	13	14	15	16	17	18	19	20			
Bologna	0.61	1.06	0.81	0.87	0.75	0.55	0.69	0.55	0.54	0.37		0.68	68
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.45	0.83	0.06	0.18	0.06	0.02	0.00	0.06	0.10	0.26		0.20	88
Firenze t. n.	0.78	1.13	0.47	0.72	0.70	0.35	0.26	0.54	0.26	0.33		0.54	88
Livorno	1.44	3.85	1.08	5.06	1.68	0.72	0.96	0.24	0.12	0.36		1.55	18
Fermo	1.04	0.00	0.00	0.05	0.30	0.00	0.00	0.00	0.00	0.00		0.13	12
M. Fortino	—	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71		0.08	21
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	28
Roma	0.69	0.77	0.38	0.63	0.47	0.26	0.32	0.26	0.43	0.49		0.47	84
Rocca di Papa	1.68	1.68	0.00	1.68	0.84	4.21	0.00	0.00	0.00	2.10		1.21	25
Velletri	1.25	1.02	0.78	0.89	0.37	0.61	0.16	0.37	0.45	0.30		0.62	323
Ceccano	1.46	—	0.00	0.00	—	—	0.00	0.00	0.00	0.00		0.21	13
Foggia	0.90	0.12	0.21	1.54	0.12	1.54	0.25	0.04	0.17	0.00		0.36	40
Corleone	0.90	0.90	1.63	1.81	2.53	1.99	1.81	1.81	1.27	1.81		1.64	40
Med. gen. diurna	0.93	0.94	0.41	1.03	0.65	0.85	0.34	0.29	0.25	0.51		0.62	843
Decade III.	21	22	23	24	25	26	27	28	29	30			
Bologna	1.03	1.45	0.37	0.43	0.49	0.63	1.18	0.49	0.91	1.18		0.81	65
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.08	0.16	0.16	0.12	0.24	0.06	0.30	0.08	0.26	0.57		0.20	102
Firenze t. n.	0.54	0.83	0.26	0.02	0.09	0.09	0.67	0.43	1.13	0.87		0.47	102
Livorno	0.72	1.92	0.72	0.12	0.24	0.12	1.44	0.31	1.32	0.96		0.78	19
Fermo	0.00	0.00	0.11	0.13	0.03	0.02	0.24	0.31	0.16	1.29		0.22	28
M. Fortino	0.00	0.00	0.00	0.14	—	0.00	1.43	0.14	0.00	0.14		0.20	16
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	21
Roma	0.33	0.68	0.56	0.54	0.52	0.34	0.82	0.61	0.30	1.64		0.63	63
Rocca di Papa	—	—	—	—	0.00	3.37	4.21	0.00	1.34	2.16		1.84	22
Velletri	0.42	0.30	0.17	0.24	0.32	0.34	0.63	0.60	0.51	1.91		0.54	335
Ceccano	0.00	0.00	—	—	0.35	0.00	0.00	0.00	0.00	0.00		0.04	15
Foggia	0.12	0.08	0.25	1.12	0.00	0.21	0.43	0.34	0.69	2.70		0.59	40
Corleone	0.90	1.08	1.81	1.08	1.81	1.44	1.08	1.81	1.81	0.54		1.38	40
Med. gen. diurna	0.34	0.54	0.40	0.85	0.34	0.50	0.95	0.39	0.64	1.07		0.58	868

9-14-18 June 1881 → 7 June 7.95 14 June 5.06 16 June 4.21 (microseismic maximums)

1881-06-09	Basso Vallese
1881-06-14 01:30	Interlaken
1881-06-18 02:50	Carnia

June 12, 1881 06:56:47 Full Moon 21°23'25 362063.98 km

June 18, 1881 21:18:37 Last quarter 27°41'17 376431.65 km

1881 LUGLIO Decade I.	1	2	3	4	5	6	7	8	9	10		Media	N.d'Os.
Bologna	0.37	0.48	0.37	0 31	0.27	0.4:	0 63	0.92	0.63	1.06		0.54	63
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.28	0.2?	0.14	0.26	0.12	0.14	0.14	0.26	2.25	1.32		0.53	89
Firenze t. a.	0.35	0.29	0.20	0.13	0.20	0.13	1.15	1.52	0.76	1.26		0.61	89
Livorno	0.48	0.13	0.35	0.35	0.00	0.12	3.85	3.76	4.04	1.68		1.47	20
Fermo	0.40	0.40	0.06	0.48	0.00	0.00	0.00	0.05	0.10	0.00		0.15	25
M. Fortino.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	18
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00		0.02	25
Roma	1.44	0.30	0 25	0.28	0.41	0.41	0.41	1.13	0.41	0.51		0.55	42
Rocca di Papa	2.88	1.96	1.85	0.95	1.05	0.56	1.32	1.89	0 28	1.26		1.39	56
Velletri	1.81	0.66	0.42	0.40	0.38	0.30	0.38	0.41	0.51	0.64		0.59	309
Ceccano	0.00	0.00	0.00	0.00	—	0.00	—	—	0.00	--		0.00	10
Foggia	2.74	1.93	0.21	2.01	1.07	0.00	0.56	1.49	1.93	0.00		1.20	40
Corleone	0.90	0.72	0.72	1.08	0.90	1.68	1.27	1.44	1.08	1 81		1.08	40
Med. gen. diurna	0 89	0.54	0.35	0.48	0.38	0.28	0.80	1.06	0.92	0.73		0.64	826
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**			
Bologna	0 31	0.75	0.25	0.37	0.37	0.31	0. 81	0.63	1.00	0 87		0.56	60
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a	0.14	0.61	0.04	1.01	0.08	0.14	0.18	0.14	0.12	0.16		0.26	95
Firenze t. n.	0.54	0.04	0.35	0.59	0.17	0.15	0.67	0.31	0.33	0.17		0.33	95
Livorno	1.92	0.24	0.14	0.21	0.24	0.48	1.20	0.48	0.31	0.35		0.56	20
Fermo	1.19	0.76	0.03	0.26	0.00	0.02	0.07	0.09	0.03	0.00		0.24	26
M. Fortino	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	21
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00		0.02	27
Roma	0.53	0.51	0.27	0.41	0.47	0.20	0.10	0.06	0.20	0.32		0.30	32
Rocca di Papa	0.98	1.85	1.68	1.68	0.84	0.00	1.47	—	0.00	2.24		1.19	35
Velletri	0.64	0.68	0.44	0.29	0.48	0.33	0.60	0.43	0.45	0.50		0.48	308
Ceccano	1.76	—	—	—	—	—	0.58	0.00	—	6.16		2 12	13
Foggia	1.29	1.58	1.25	0.90	0.81	0.56	0.38	1.66	0.73	0.43		0.98	40
Corleone	1.08	0.90	—	—	—	—	—	—	—	1.08		1.03	12
Med. gen. diurna	0.79	0.66	0.40	0.52	0.31	0.19	0. 0	0.36	0.28	0.94		0.62	784
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**		
Bologna	1.18	1.27	0.75	0.43	0.81	0.37	2.07	1.55	0 81	1.06	0.63	0.99	67
Rimini	—	—	—	—	—	—	—	—	—	—	—	—	—
Firenze t. a	0.34	1.74	1.28	0.26	0.34	0.41	1.26	1 34	0 41	0.61	0.55	0.77	103
Firenze t. n.	0.65	1.37	1.02	0.47	0.45	0.78	1.28	1.13	0.51	0.41	0.43	0.76	103
Livorno	0.96	6.74	2.16	0.31	0.31	0.79	6.74	2.41	0.60	0.31	0.21	1.96	21
Fermo	0.00	0.22	0.32	0.51	0.02	0.26	1.58	1.83	1.08	0.65	0.05	0.59	34
M. Fortino	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26
Narni	—	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	0.00	0.52	0.17	0.17	0.00	0.35	2.11	0.70	0.00	0.00	0.00	0.36	30
Roma	0.27	0.54	0.61	0.82	0.54	0.61	2.10	0.89	3.43	0.46	0.51	0.98	40
Rocca di Papa	3.70	1.05	0.84	3.87	0.56	0.84	2.52	—	0.00	0.28	0.00	1.31	31
Velletri	0.47	0.58	1.09	1.01	0.52	0.58	1.61	1.55	3 11	0.70	0.29	1.05	362
Ceccano	0.87	0.00	0.58	0.00	0.00	0.00	0.43	1.88	2.13	0.17	0.00	0.55	53
Foggia	0.17	1.88	1.07	1.75	1.49	0.17	2.66	2 62	2.23	0.86	0.00	1.35	44
Corleone	0.72	0.90	0.36	0.9	1.27	1.08	0.9	0.90	1.81	1.63	0.54	1.00	44
Med. gen. diurna	0.71	1.29	0.79	0.77	0.48	0.48	1.94	1.40	1.24	0.55	0.25	0.99	958
1881 AGOSTO Decade I.	1	2	3	4	5	6	7	8	9	10			
Bologna	0.31	0.43	0.92	1.06	1.00	0.69	0.69	0.45	0.69	1.61		0.78	59
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	20
Firenze t. a.	0.21	0.14	0.10	0.51	0.16	0.59	1.32	0.43	0.20	2.01		0.57	105
Firenze t. n.	0.26	0 39	0.39	0.29	0.47	0.33	0.63	0.70	0.39	2.17		0.59	105
Livorno	0.77	0.09	1.44	0.48	0.21	0.12	0.24	0.07	0.14	1.92		0.55	19
Fermo	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0.00	0.00		0.00	35
M. Fortino	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.96	0.00	0 00		0.10	26
Narni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.49	1.62		0.61	30

18-22 July → 20 July 6.16 (microseismic maximum)

1881-07-18	19:30	Fango
1881-07-22		Belledonne-Pelvoux
1881-07-22	02	Genevois (Chaine des Aravis ?)
1881-07-22	02:45	Belledonne-Pelvoux

18 Jul 1881	05:33:40	Last quarter	25°40'18	382853.95 km
26 Jul 1881	05:19:21	New Moon	03°18'15	406581.25 km

Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	—	—	—	—		0.00	17
Roma	0.30	0.28	0.16	0.28	0.21	0.25	0.41	0.69	0.30	0.50		0.33	41
Rocca di Papa	0.00	0.33	1.51	0.00	0.00	0.84	1.96	2.91	0.84	2.52		1.09	34
Velletri	0.42	0.50	0.62	0.46	0.42	0.35	0.80	0.66	0.51	0.87		0.56	339
Ceccano	0.00	0.00	3.28	0.00	0.00	0.00	0.00	—	—	—		0.46	43
Foggia	0.17	0.00	0.69	2.74	1.66	0.69	1.12	0.69	0.25	0.51		0.85	40
Corleone	0.90	1.27	0.72	0.54	0.90	0.36	1.27	1.45	1.45	1.27		1.01	40
Med. gen. diurna	0.23	0.23	0.70	0.42	0.33	0.28	0.60	0.79	0.48	1.38		0.54	958
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**		**Media**	**N.d'Os.**
Bologna	2.45	0.92	0.55	1.61	3.36	0.55	1.18	1.53	1.00	0.75		1.39	65
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	20
Firenze t. a	1.05	0.57	0.21	2.23	1.64	0.83	2.70	2.23	0.65	0.24		1.23	101
Firenze t. n	1.19	0.65	0.76	2.15	2.00	0.91	1.09	2.06	0.80	0.43		1.19	101
Livorno	4.57	1.68	4.09	2.89	1.20	1.44	2.89	5.30	2.89	0.12		2.70	19
Fermo	0.00	0.00	0.00	0.00	0.00	0.06	—	0.57	0.82	0.52		0.22	27
M. Fortino	0.00	0.00	0.71	0.00	1.91	0.00	0.47	3.34	0.00	0.00		0.64	28
Narni	2.72	0.14	0.00	1.49	0.39	0.07	1.63	5.97	0.00	0.81		1.32	21
Viterbo	—	—	—	1.05	1.93	0.00	0.00	—	0.00	—		0.59	10
Roma	0.71	0.00	0.10	0.00	1.03	0.40	0.00	1.16	0.61	0.07		0.40	28
Rocca di Papa	2.24	0.56	1.68	2.52	2.52	2.38	1.68	3.37	0.00	0.00		1.69	32
Velletri	1.02	0.40	0.42	1.20	2.55	1.11	1.68	1.65	0.81	0.41		1.13	339
Ceccano	—	—	—	—	—	—	—	—	0.00	0.12		0.06	10
Foggia	0.98	0.64	0.50	0.43	5.82	3.03	1.88	3.59	0.69	0.69		1.83	40
Corleone	0.90	0.72	1.81	1.27	1.08	0.36	0.72	1.45	1.45	1.63		1.13	40
Med. gen. diurna	1.37	0.48	0.84	1.20	1.81	0.79	1.22	2.47	0.64	0.41		1.12	881
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**		
Bologna	0.68	0.55	0.94	0.51	1.49	1.49	0.87	1.65	1.57	0.82	0.49	1.00	70
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.26	0.00	0.00	0.29	22
Firenze t. a	0.12	0.30	0.14	0.20	0.71	0.13	0.63	1.42	0.69	0.26	0.04	0.42	95
Firenze t. n	0.65	1.09	1.09	1.17	0.87	0.61	0.22	1.56	1.19	0.87	0.85	0.92	95
Livorno	0.48	0.60	1.44	3.61	0.72	0.53	0.14	6.02	2.89	0.48	0.48	1.58	21
Fermo	0.00	0.05	0.43	0.34	0.28	0.20	0.23	0.09	0.00	1.15	0.51	0.29	28
M. Fortino	0.00	2.58	0.00	2.39	1.91	0.00	0.00	5.30	0.00	0.00	0.00	1.10	30
Narni	0.00	3.80	0.00	0.07	0.81	0.00	0.07	0.81	1.49	0.05	0.00	0.64	23
Viterbo	—	—	—	—	—	—	—	1.05	0.17	0.52	0.00	0.43	12
Roma	0.20	0.54	0.68	0.54	0.40	0.56	0.24	0.51	0.71	0.82	0.05	0.47	34
Rocca di Papa	1.68	3.37	0.84	0.56	0.56	0.00	0.00	0.00	0.00	2.10	0.00	0.82	28
Velletri	0.33	0.64	0.74	0.55	0.54	0.91	0.44	3.70	1.24	1.47	0.36	0.99	339
Ceccano	0.17	0.14	0.70	0.10	0.12	0.00	0.00	0.35	0.44	0.00	0.00	0.18	56
Foggia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.97	1.75	2.49	0.00	0.56	44
Corleone	0.72	0.90	0.90	1.45	0.90	0.36	1.27	0.90	1.81	1.63	1.81	1.15	44
Med. gen. diurna	0.35	1.04	0.56	0.82	0.66	0.34	0.29	1.68	1.14	0.84	0.30	0.72	911
1881 SETTEMBRE Decade I.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			
Bologna	2.76	1.55	1.27	0.37	1.62	0.81	3.06	0.63	1.30	1.06		1.44	60
Rimini	0.00	0.00	4.95	1.41	0.00	0.00	0.00	0.00	0.00	1.55		0.79	20
Firenze t. a	0.00	0.18	0.14	0.14	0.22	0.57	0.45	0.53	1.07	2.98		0.63	83
Firenze t. n	1.09	1.02	0.78	0.59	0.70	0.59	2.21	0.22	0.54	0.80		0.85	83
Livorno	7.90	4.82	3.61	2.89	0.24	3.37	—	0.96	3.13	1.80		3.19	16
Fermo	0.13	1.65	0.92	0.38	0.78	0.57	0.98	0.53	0.16	1.19		0.72	23
M. Fortino	0.75	2.87	1.09	0.00	0.00	0.00	7.91	0.47	0.00	0.00		1.30	24
Narni	0.09	6.16	0.00	0.56	0.37	0.00	3.73	0.49	0.54	0.00		1.19	28
Viterbo	1.48	1.05	0.00	0.00	—	—	1.58	0.00	0.00	0.00		0.51	22
Roma	1.31	2.77	0.46	0.00	0.00	0.00	1.43	0.82	0.40	1.25		0.84	42
Rocca di Papa	4.98	1.68	1.68	1.12	0.00	3.37	0.84	0.84	0.56	0.42		1.54	34
Velletri	2.80	2.49	1.56	0.56	0.41	0.38	1.21	0.67	0.42	2.91		1.34	306
Ceccano	2.13	1.50	0.99	0.00	0.00	0.00	0.43	0.00	0.00	0.00		0.50	56
Foggia	1.93	4.28	1.75	0.69	0.51	1.84	2.06	0.51	0.00	1.03		1.46	40
Corleone	2.35	1.63	1.08	0.36	0.18	0.72	0.36	0.18	1.08	0.72		0.86	40
Med. gen. diurna	1.98	2.21	1.35	0.60	0.35	0.87	1.87	0.45	0.61	1.05		1.14	877

August 3, 1881 3.28 ; August 15, 5.82 ; August 28, 6.62

1881-08-03	14:42	Alessandrino
1881-08-05		Belledonne-Pelvoux

3 August 1881	04:42:49	First quarter	10°56'05 383	704.82 km
9 August 1881	21:07:07	Full Moon	17°20'25 357	400.90 km

Decade II.	11	12	13	14	15	16	17	18	19	20	Media	N.d'Os.
Bologna	1.12	1.13	1.12	0.49	0.25	0.84	1.06	0.92	1.49	0.43	0.88	60
Rimini	0.00	1.01	0.00	0.00	1.69	0.00	0.00	0.00	2.54	0.84	0.60	20
Firenze t. a.	0.16	0.71	0.47	0.36	0.04	0.49	0.30	0.36	0.30	0.20	0.32	99
Firenze t. n.	0.54	1.98	0.89	0.83	0.39	0.87	0.59	0.65	0.67	0.74	0.80	99
Livorno	0.84	3.13	2.89	0.96	0.14	1.68	0.48	0.48	0.07	0.24	1.09	20
Fermo	0.19	0.00	0.00	0.78	0.76	0.26	0.91	—	—	0.00	0.36	18
M. Fortino	0.71	0.00	1.43	0.00	0.00	0.47	0.71	0.00	0.00	0.00	0.33	23
Narni	1.49	0.00	0.00	0.00	0.09	0.14	0.61	0.00	0.00	0.05	0.24	26
Viterbo	1.32	0.26	0.00	0.00	0.00	0.00	0.53	0.00	0.00	0.17	0.22	27
Roma	1.64	0.61	0.30	0.00	0.35	0.20	0.86	0.82	0.00	0.00	0.17	26
Rocca di Papa	2.52	1.12	1.12	0.00	0.84	0.00	0.00	1.68	0.00	—	0.80	20
Velletri	1.59	0.93	0.56	0.60	0.62	0.55	1.39	2.00	0.40	0.60	0.92	220
Ceccano	0.73	0.00	0.00	0.00	0.00	0.78	0.21	0.65	0.00	0.00	0.23	50
Foggia	0.90	1.93	0.98	0.29	1.49	2.14	3.34	1.20	0.34	0.64	1.33	40
Corleone	0.99	1.27	1.81	0.72	0.72	0.54	0.90	0.18	0.90	1.63	1.06	40
Med. gen. diurna	1.04	0.93	0.77	0.33	0.49	0.59	0.79	0.59	0.44	0.36	0.64	788
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**		
Bologna	1.24	1.24	3.16	2.99	3.16	1.12	1.76	1.97	2.85	4.48	2.39	62
Rimini	0.00	0.00	0.00	0.00	3.96	3.25	3.67	2.12	1.98	2.54	1.75	20
Firenze t. a.	0.24	2.98	2.80	0.36	0.75	0.47	0.32	2.07	0.28	2.15	1.24	114
Firenze t. n.	0.78	2.54	1.52	1.09	1.15	0.93	0.74	3.55	1.09	2.04	1.54	114
Livorno	0.72	7.71	5.51	1.44	1.34	0.24	0.48	6.26	0.24	2.41	2.10	20
Fermo	0.00	0.15	0.61	0.59	0.76	0.59	1.28	0.05	0.98	0.84	0.55	21
M. Fortino	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.35	—	—	0.16	17
Narni	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	0.35	1.23	1.23	0.70	1.05	1.23	0.88	0.00	1.58	1.76	1.00	28
Roma	0.00	—	1.37	—	1.64	1.64	2.47	0.49	0.00	0.97	1.06	17
Rocca di Papa	0.84	—	2.21	0.00	—	0.42	3.37	0.00	2.02	2.52	1.42	24
Velletri	0.43	1.16	1.26	1.62	1.08	2.54	1.67	0.52	0.71	1.21	1.22	221
Ceccano	0.00	0.00	0.14	0.22	0.00	0.87	0.87	0.17	0.17	0.52	0.29	45
Foggia	0.00	1.97	2.53	2.62	4.06	4.15	0.69	3.71	1.84	3.03	2.46	40
Corleone	0.18	0.90	0.00	1.81	1.45	1.08	0.90	0.72	1.81	0.72	0.95	40
Med. gen. diurna	0.36	1.38	1.49	0.89	1.36	1.23	1.27	1.05	1.03	1.67	1.20	783
1881 OTTOBRE **Decade I.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
Bologna	5.00	4.43	2.29	2.30	1.87	3.29	1.98	2.67	1.24	1.49	2.65	65
Rimini	4.95	2.54	1.83	0.99	0.99	0.28	0.00	0.00	0.00	0.00	1.15	20
Firenze t. a.	1.00	0.81	0.38	0.61	0.61	0.61	1.26	1.70	1.36	1.11	1.00	110
Firenze t. n.	1.93	1.76	0.56	0.83	1.41	1.89	1.96	2.65	0.61	0.80	1.43	110
Livorno	0.48	0.96	0.48	1.44	0.72	4.82	3.42	7.23	2.16	0.38	2.20	20
Fermo	1.15	1.02	1.19	1.90	2.90	1.21	2.69	1.13	1.59	1.38	1.61	20
M. Fortino	—	—	—	—	—	—	—	—	—	—	—	—
Narni	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	2.82	0.39	0.00	0.00	1.19	1.05	1.58	0.79	1.32	0.17	0.93	31
Roma	—	0.41	0.20	0.41	0.88	0.61	0.51	1.02	1.64	0.76	0.71	21
Rocca di Papa	0.00	3.36	0.84	0.00	1.68	1.96	2.24	0.42	1.40	0.00	1.19	28
Velletri	1.38	0.70	0.45	0.43	1.47	0.94	2.22	0.83	1.07	0.76	1.02	315
Ceccano	0.00	0.00	0.00	0.00	0.70	0.00	0.65	0.00	0.00	0.00	0.13	40
Foggia	2.40	1.37	1.41	1.88	1.25	1.88	1.58	0.86	0.86	1.08	1.45	40
Corleone	0.54	1.27	0.90	0.54	0.54	1.45	0.36	0.72	0.36	0.54	0.72	40
Med. gen. diurna	1.85	1.46	0.81	0.87	1.24	1.53	1.57	1.54	1.04	0.64	1.25	860
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**		
Bologna	1.67	1.18	0.63	0.63	1.06	2.79	0.92	0.92	0.87	1.61	1.22	57
Rimini	0.00	0.00	0.00	0.00	0.99	1.69	1.83	0.00	0.00	0.00	0.45	20
Firenze t. a.	1.38	0.69	0.61	1.07	0.24	2.78	0.73	0.61	0.71	2.86	1.15	108
Firenze t. n.	1.52	0.98	0.78	1.28	1.52	1.76	1.02	0.91	1.90	4.35	1.61	108
Livorno	2.89	0.09	0.72	1.20	5.78	3.13	1.20	0.33	0.72	4.57	2.06	19
Fermo	2.25	1.17	1.79	1.00	0.21	1.79	1.71	0.07	0.00	0.31	1.03	20
M. Fortino	—	—	—	0.00	—	—	—	0.00	0.00	0.00	0.00	8
Narni	—	—	—	—	—	—	—	—	—	—	—	—

1 September 7.90 – 2 Sept. 6.16 – 7 Sept. 7.91 – 22 Sept. 7.71 – 23 Sept. 5.51 - 28 Sept. 6.26

1881-09-10	07	Chietino
1881-09-21	21:20	Tarentaise (Moutiers)
1881-09-28		Cesena

September 15, 1881	08:01:40	Last quarter	22°35'30	397730.55 km
September 23, 1881	11:54:48	New Moon	00°34'30	397300.47 km
September 30, 1881	21:48:28	First quarter	07°51'26	372356.18 km

Viterbo	0.00	0.00	0.00	0.79	1.41	0.00	0.26	0.17	0.35	1.32		0.43	25
Roma	0.92	1.06	0.51	0.41	1.02	1.44	1.13	—	0.51	2.06		1.01	26
Rocca di Papa	1.26	0.00	0.42	—	2.36	1.68	0.42	0.84	0.00	1.68		0.96	27
Velletri	0.89	1.30	0.64	0.85	1.05	2.96	1.58	0.79	0.29	1.69		1.20	317
Ceccano	0.00	0.00	0.58	0.00	0.00	0.00	0.43	0.52	0.43	0.00		0.19	33
Foggia	5.43	0.86	0.00	0.69	1.93	4.96	1.41	2.06	0.98	0.69		1.90	40
Corleone	1.63	0.54	1.27	1.27	0.72	1.27	0.90	0.36	1.08	1.08		1.01	40
Med. gen. diurna	1.52	0.60	0.61	0.70	1.40	2.01	1.04	0.58	0.56	1.58		1.06	848
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**Media**	**N.d'Os.**
Bologna	2.24	1.37	2.79	1.87	1.12	1.24	0.75	0.45	0.15	0.82	0.75	1.23	58
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22
Firenze t. a	6.04	2.23	1.03	1.11	2.03	0.51	0.47	0.43	0.71	1.76	1.32	1.60	112
Firenze t. n	2.79	2.00	0.22	1.48	1.35	0.74	1.68	0.87	1.02	0.89	1.76	1.33	112
Livorno	10.12	2.89	10.11	2.65	—	2.16	1.44	0.72	0.72	0.96	2.89	3.46	20
Fermo	0.92	1.34	1.25	0.90	0.90	0.84	0.86	0.98	0.55	1.42	1.15	1.01	23
M. Fortino	1.92	0.00	0.00	0.47	0.71	0.00	0.00	0.00	0.00	1.43	—	0.45	26
Narni	—	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	2.64	0.13	1.05	1.94	0.00	0.35	1.05	0.00	0.26	2.11	3.44	1.17	34
Roma	1.91	1.09	0.00	0.75	0.56	0.92	0.82	0.64	0.82	1.91	2.59	1.09	60
Rocca di Papa	—	—	—	2.52	—	0.00	2.24	0.00	0.00	0.00	0.00	0.68	15
Velletri	3.30	1.12	0.86	1.15	1.48	0.94	0.81	0.32	2.44	2.05	2.39	1.53	364
Ceccano	0.43	0.00	0.35	0.00	0.17	0.00	0.00	0.00	0.00	0.00	1.31	0.20	39
Foggia	3.42	0.86	0.51	1.88	3.76	1.84	0.00	0.34	1.71	2.66	2.40	1.76	44
Corleone	1.81	0.90	0.54	0.54	1.45	1.81	0.90	1.81	2.35	1.45	0.90	1.31	44
Med. gen. diurna	2.88	1.07	1.44	1.23	1.12	0.81	0.78	0.46	0.76	1.24	1.60	1.21	973
1881 NOVEMBRE **Decade I.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			
Bologna	1.30	1.86	0.68	0.52	0.37	0.00	0.25	0.43	0.69	1.61		0.76	58
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a	3.59	0.26	0.73	0.59	0.57	0.38	0.61	0.34	1.76	1.22		0.99	96
Firenze t n	2.24	1.52	1.03	0.70	0.83	0.93	0.85	0.89	1.41	1.74		1.26	96
Livorno	0.96	1.68	1.44	0.72	0.48	0.48	0.00	0.48	3.13	1.20		1.05	18
Fermo	1.19	—	—	—	0.46	0.11	0.65	0.77	3.97	4.53		1.66	12
M. Fortino	1.43	1.91	0.00	0.71	0.00	0.00	0.00	0.45	1.44	0.95		0.68	25
Narni	0.75	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.44		0.14	25
Viterbo	2.17	1.05	0.35	0.00	0.00	0.17	0.00	0.32	1.94	1.85		0.78	36
Roma	5.79	1.40	0.69	0.33	0.20	0.22	0.20	0.26	3.88	1.75		1.47	105
Rocca di Papa	0.00	1.68	2.52	0.84	0.00	0.00	0.00	1.68	1.68	—		0.93	19
Velletri	9.17	2.08	0.44	0.36	0.32	0.16	0.35	0.75	4.78	2.79		2.12	322
Ceccano	2.63	0.43	0.00	0.21	0.00	0.00	0.35	0.00	2.28	1.31		0.73	35
Foggia	4.58	4.40	0.17	0.77	0.18	0.51	0.90	0.86	1.66	4.32		1.91	40
Corleone	1.81	0.54	1.27	0.36	0.90	1.08	1.27	1.08	0.18	1.08		0.95	40
Med. gen. diurna	2.68	1.44	0.73	0.47	0.36	0.28	0.38	0.59	2.05	1.90		1.10	927
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**			
Bologna	1.92	0.30	—	—	—	—	0.75	1.04	1.19	1.06		1.04	33
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a	0.85	0.36	0.43	0.73	0.65	10.22	0.81	1.46	1.01	0.67		2.27	107
Firenze t. n	1.28	0.72	0.96	0.47	0.70	2.37	1.15	1.85	0.70	1.09		1.11	107
Livorno	0.96	0.48	0.96	0.48	0.48	0.55	3.32	2.21	1.44	1.68		1.25	17
Fermo	4.14	1.13	0.26	0.22	0.86	0.70	0.03	3.12	2.11	0.38		1.29	24
M. Fortino	0.47	0.00	0.00	0.00	0.00	0.00	0.00	1.91	0.95	1.43		0.47	25
Narni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.64	0.00		0.16	26
Viterbo	0.79	0.00	0.00	0.00	0.17	0.00	0.00	3.00	1.94	0.70		0.66	26
Roma	1.08	0.53	0.24	0.43	0.32	0.28	0.12	1.25	2.94	0.64		0.78	99
Rocca di Papa	1.68	2.02	0.00	2.10	0.84	0.00	2.80	0.00	0.00	2.52		1.19	29
Velletri	1.76	0.64	0.40	1.10	0.43	4.55	0.28	2.29	5.68	1.08		1.82	333
Ceccano	0.87	0.00	0.00	0.00	0.00	0.00	0.00	3.22	4.92	0.43		0.94	32
Foggia	4.06	2.49	0.81	2.27	2.55	3.08	0.38	1.66	2.95	2.49		2.27	40
Corleone	0.54	1.63	1.27	1.81	2.35	1.63	1.45	2.17	1.81	2.35		1.70	40
Med. gen. diurna	1.45	0.72	0.41	0.74	0.72	2.23	0.79	1.80	2.09	1.18		1.21	938

1 October 4.95 – 11 October 5.43 – 15 October 5.78 – 16 October 4.96 – 21-23 October 10.12

7 October 1881 13:59:21 Full Moon 14°26'15 369396.50 km

1 November 5.79 – 9 November 4.78 – 16 November 13.92 – 19 November 5.68

1881-11-05 08:42	Carinthia, Gmuend
1881-11-14 02:55	Montreux
1881-11-25 17:25	Vaud, Aigle

November 6, 1881 02:03:17 Full Moon 13°49'52 380012.05 km

November 13, 1881 23:01:27 Last quarter 21°45'01 404240.24 km

November 21, 1881 16:21:36 New Moon 29°32'50 375651.69 km

November 28, 1881 12:01:39 First quarter 06°27'09 370979.09 km

Decade III.	21	22	23	24	25	26	27	28	29	30	Media	N.d'Os.
Bologna	0.37	0.82	0 52	1.80	0.75	1.42	1.63	1.49	2 66	1.43	1. 28	57
Rimini	—	—	—	—	—	—	—	—	—	—	—	—
Firenze t. a.	0. 63	1.07	1.56	0.59	1.68	0.30	0.81	1 28	1.34	1. 17	1.03	102
Firenze t. n.	1.02	0. 89	0. 87	0. 70	1.67	0. 33	0. 72	1.41	2. 37	2. 30	1. 22	102
Livorno	0. 96	1. 44	0. 48	0. 60	1. 26	0. 48	—	—	—	—	0. 86	11
Fermo	0. 42	0. 16	0. 12	0. 00	0. 25	0. 09	0. 19	0. 36	0. 28	0. 38	0. 22	20
M. Fortino	0. 00	1. 13	0. 00	0. 04	1. 91	o. oo	o. oo	1. 43	0. 00	o. oo	0. 48	24
Narni	0. 00	0. 15	2. 39	0. 37	0. 15	o. oo	o. oo	o. oo	0. 00	o. oo	0. 30	31
Viterbo	0. 60	0. 00	0. 00	0. 00	o. oo	o. oo	o. oo	1. 76	1. 72	1. 90	0. 53	30
Roma	0. 12	0. 23	0. 70	0. 34	0. 31	0. 14	0. 12	0. 75	0. 58	o. 64	0. 39	86
Rocca di Papa	0. 00	2. 24	1. 68	2. 94	o. oo	1 68	o. oo	0. 00	o. oo	o. oo	0. 85	25
Velletri	0. 38	0. 40	0. 58	0. 26	0. 59	0. 53	0. 45	0. 62	0. 77	0. 69	0. 53	340
Ceccano	0. 00	0. 21	0. 58	o. oo	1. 31	o. oo	o. oo	0. 00	0. 58	o. oo	0. 26	29
Foggia	0. 73	0. 86	1. 03	0. 60	0. 56	0. 51	o. oo	1 03	0. 17	o. 12	0. 56	40
Corleone	0. 08	0. 90	0. 18	1. 27	1. 08	0. 72	o. 36	1. 08	1. 63	1. 63	0. 99	40
Med. gen. diurna	0. 40	0. 77	0. 76	0. 68	0. 82	0. 45	o. 33	0. 86	0. 93	0. 79	0. 67	937

MEDIE MENSILI

STAZIONI	1880 Dccembre	1880 Gennaio	Febbraio	Marzo	Aprile	Maggio	Giugno	Luglio	Agosto	Settembre	Ottobre	Novembre	Media annua locale	Numero d'Osservazioni
Bologna	0. 83	1. 97	1. 84	0. 86	1. 01	0. 90	o. 89	0. 69	1. 05	1. 57	1. 70	1. o2	1. 19	2187
Rimini	0. 17	1. 44	0. 51	0. 32	0. 29	0. 30	—	—	0. 09	1. 04	0. 53	—	0. 52	548
Firenze t. a.	1. 16	2. 72	1. 41	0. 95	0. 93	0. 30	0. 38	0. 52	0. 74	0. 73	1. 24	1. 42	1. 04	3790
Firenze t. n.	1. 09	3. 12	1. 76	1. 32	1. 19	0. 61	0. 70	0. 56	0. 89	1. 06	1. 46	1. 19	1. 21	3789
Livorno	2. 15	5. 83	1. 40	2. 62	2. 02	1. 38	1. 46	1. 33	1. 61	1. 99	2. 57	1. 05	2. 11	680
Fermo	0. 82	4. 00	1. 48	1. 41	0. 58	0. 39	0. 26	0 32	0. 17	0. 53	1. 21	1. 05	1. 01	881
M. Fortino	1. 52	1. 73	1. 85	1. 14	0. 75	1. 06	1. 37	o. 00	0. 61	0. 59	0. 22	o. 54	0. 94	825
Narni	0. 26	1. 05	—	1. 29	0. 97	0. 99	—	—	0. 85	0. 71	—	o. 2o	0. 79	614
Viterbo	0. 88	2. 68	0. 80	0. 93	0. 50	0. 29	0. 17	0. 13	1. 34	0. 57	o. 84	o. 65	0. 73	994
Roma	1. 11	2. 72	1. 37	1. 44	0. 89	0. 50	0. 61	0. 61	0. 40	0. 79	0. 94	o. 88	1. 02	2539
Bocca di Papa	1. 03	2. 03	1. 17	1. 53	1. 16	1. 06	1. 53	1. 29	1. 20	1. 25	. 94	0. 99	1. 26	1058
Velletri	0. 89	2. 07	1. 11	1. 44	1. 10	0. 72	0. 73	0. 71	0. 90	1. 16	1. 25	1. 19	1. 12	1169
Ceccano	0. 23	1. 14	0. 72	0. 46	0. 29	0. 48	0. 43	0. 89	0. 23	0. 34	0. 17	0. 61	0. 50	1263
Foggia	1. 41	2. 00	1. 68	2. 60	1. 18	0. 85	0. 62	1. 17	1. 08	—	1. 70	1. 58	1. 44	1340
Corleone	1. 41	1. 48	1. 36	1. 40	1. 41	1. 30	1. 34	1. 03	1. 09	0. 95	1. 01	1. 21	1. 25	1428
Media generale	0. 99	2. 43	1. 31	1. 32	0. 95	0. 79	0. 82	0. 75	0. 79	0. 97	1. 17	0. 99	1. 07	
Tot. delle Osserv.	2751	3083	2579	3017	2871	2935	2661	2568	2745	2328	2081	2802		39021

Cholet
Tours
Digione
Basilea
Sciaffusa
BAVIERA
Zurigo
Salisburgo
Győr
Budapest
Debrecen
Bistrița
Poitiers
Bourges
Besançon
Berna
Itinerari tematici
AUSTRIA
Graz
Székesfehérvár
Oradea
Cluj-Napoca
Niort
Montluçon
Moulins
Losanna
Laghi e ghiacciai
Klagenfurt
Maribor
UNGHERIA
ROMANIA
LIMOSINO
Roanne
Sion
Bellinzona
Seghedino
Arad
Clermont-Ferrand
Lione
Ginevra
Pisco Rotondo
Trento
Celje
Kaposvár
Pécs
Brașov
Timișoara
SLOVENIA
Zagabria
Bordeaux
FRANCIA
ALVERNIA
Saint-Étienne
Novara
Brescia
Trieste
Osijek
Rimnicu Vilcea
Milano
CROAZIA
Novi Sad
AQUITANIA
Cahors
Valence
Venezia
Rijeka
Fiume
Drobeta-Turnu Severin
Slatina
Agen
Torino
Ferrara
Belgrado
Montauban
Alès
Modena
Banja Luka
Craiova
Auch
Gap
Genova
SERBIA
Tolosa
Imperia
Bologna
Rimini
BOSNIA-ERZEGOVINA
Kragujevac
Pleven
Tarbes
Montpellier
Nimes
Pistoia
Forlì
SERBIA E MONTENEGRO
BULGARIA
Andorra la Vella
Marsiglia
Monaco
Livorno
Firenze
Ancona
Split
Spalato
Tolone
TOSCANA
Perugia
Priština
Sofia
Perpignano
Grosseto
Terni
Pescara
Mare Adriatico
Podgorica
SPAGNA
Figueres
Gerona
Bastia
ITALIA
Pukë
Skopje
RODOPI
Lérida
Ajaccio
ABRUZZO
Scutari
Barcellona
Reus
Roma
Campobasso
Foggia
Tirana
Elbasan
Serrai
PUGLIA
Bari
Lushnjë
Salonicco
Salerno
ALBANIA
Napoli
Taranto
Véroia
Kariaí
Sassari
Valona
Kozáni
Palma di Maiorca
Sarande
Lárissa
Mar Tirreno
Corfù
Ioánnina
Vólos
Cosenza
Lamia
Cagliari
Sant'Eufemia Lamezia
Agrínion
GRECIA
Catanzaro
Patrasso
Aíyion
Mar Mediterraneo
Mar Ionio
Atene
Palermo
Messina
Athinai
Etna 3323 m
Pírgos
Tripoli
ISOLE EGEE
Biserta
Catania
Algeri
Dellys
Banzart
Bacino dello Ionio -5150 m
Kalámata
Bejaia
Tunisi
Ech Cheliff
Bouira
Costantina
Qacentina
Stif
Al Kāf
Khaniá
Souk Ahras
Nābul
Bordj Bou Arreridj
Sougueur
Batna
Monastir
CRETA
ALGERIA
TUNISIA
Lampedusa
La Valletta
Tébessa
MONTI DELL'ATLANTE
Biskra
Sfax

April 23, 1881 6.74 (Microseismic maximum)

June 9-14-18, 1881 → June 7 7.95 June 14 5.06 June 16 4.21 (microseismic maximums)

July 18-22 → July 20 6.16

August 3, 1881 3.28 ; August 15 5.82 ; 28 August 6.62

1 September 7.90 – 2 Sept. 6.16 – 7 Sept. 7.91 – 22 Sept. 7.71 – 23 Sept. 5.51 - 28 Sept. 6.26 - 1 Oct. 4.95 – 11 Oct. 5.43 – 15 Oct. 5.78 – 16 Oct .96 – 21-23 Oct. 10.12
1 November 5.79 – 9 Nov. 4.78 – 16 Nov. 13.92 – 19 Nov. 5.68

Average seismic maximums:

(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)/7

Input

$$\frac{1}{7}(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)$$

Result

8.488571428571428571428

Alternative representation

$$1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{7(2e)}} = 1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{7(2\exp(z))}} \quad \text{for } z = 1$$

Series representations

$$1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{7(2e)}} = 1+0.235611\sum_{k=0}^{\infty}\frac{1}{k!}$$

$$1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{7(2e)}} = 1+0.117805\sum_{k=0}^{\infty}\frac{1+k}{k!}$$

$$1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{7(2e)}} = 1+\frac{0.235611\sum_{k=0}^{\infty}\frac{-1+k+z}{k!}}{z}$$

$n!$ is the factorial function

From the sum of the previous values, we obtain, after some calculations:

96/(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)

Input

$$\frac{96}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}$$

Result

1.615617637159205654661730057219791316055200269269606193200942443 6
…

1.61561763715…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

And:

98/(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)

Input

$$\frac{98}{6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92}$$

Result

1.649276337933355772467182766745203635139683608212722988892628744 5
…

1.6492763379….

From the mean with the previous expression, we obtain:

1/2(((1+1/(((1/(2e))((6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)/7)))))+((98/(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92))))

Input

$$\frac{1}{2}\left(\left(1+\frac{1}{\frac{1}{2e}\left(\frac{1}{7}(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)\right)}\right)+\frac{98}{6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92}\right)$$

Result

1.64486659036037220881053538033437626193707050918713761401495747 88…

1.64486659036…. ≈ $\zeta(2) = \pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternative representation

$$\frac{1}{2}\left(\left(1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{(2\,e)\,7}}\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)=$$
$$\frac{1}{2}\left(\left(1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{(2\exp(z))\,7}}\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)\text{ for } z=1$$

Series representations

$$\frac{1}{2}\left(\left(1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{(2\,e)\,7}}\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)=$$
$$1.32464+0.117805\sum_{k=0}^{\infty}\frac{1}{k!}$$

$$\frac{1}{2}\left(\left(1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{(2e)7}}\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)=1.32464+0.0589027\sum_{k=0}^{\infty}\frac{1+k}{k!}$$

$$\frac{1}{2}\left(\left(1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{(2e)7}}\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)=1.32464+\frac{0.117805\sum_{k=0}^{\infty}\frac{-1+k+z}{k!}}{z}$$

$n!$ is the factorial function

And again:

((1/2(((1+1/(((1/(2e))((6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)/7)))))+((98/(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92))))))^15-16-Φ

Input

$$\left(\frac{1}{2}\left(\left(1+\frac{1}{\frac{1}{2e}\left(\frac{1}{7}(6.74+7.95+6.16+6.62+7.91+10.12+13.92)\right)}\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)\right)^{15}-16-\Phi$$

Φ is the golden ratio conjugate

Result

1729.04…

1729.04….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2.

Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(1/27((((1/2(((1+1/(((1/(2e))((6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)/7)))))+((98/(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92))))))^15-16-Φ)-1))^2-1/5

Input

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{2}\left(\left(1+1\Big/\left(\frac{1}{2e}\left(\frac{1}{7}(6.74+7.95+6.16+6.62+7.91+10.12+13.92)\right)\right)\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)\right)^{15}-16-\Phi\right)-1\right)^2-\frac{1}{5}$$

Φ is the golden ratio conjugate

Result

4096.01…

4096.01…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson.

This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Now let's start from the date of the **Lisbon earthquake of November 1, 1755**.

The **Lisbon earthquake of 1755** was a large one that occurred on the morning of November 1st with hypocenter not far from Lisbon, the capital of Portugal.

Let's add 14 Saros cycles to that date:

November 1, 1755 + 252 years 159 days 1 hour 48 minutes

Input interpretation

Saturday, November 1, 1755 + 252 years 159 days 1 hour 48 minutes

Result

1:48 am CEST | Tuesday, April 8, 2008

To this date we add two lines of complete rotations of the apses (2*8.85 years = 17.70 years) and subtract one lunar year:

Apr 8, 2008 + 17.70 years - 354 days 8 hours 48 minutes 36 seconds

Input interpretation

(Tuesday, April 8, 2008 + 17.7 years) – 354 days 8 hours 48 minutes 36 seconds

Result

3:11:24 am CET | Monday, December 30, 2024

From this date we subtract a lunar quarter:

Dec 30, 2024 - 118 days 2 hours 56 minutes 12 seconds

Input interpretation

Monday, December 30, 2024 – 118 days 2 hours 56 minutes 12 seconds

Result

9:03:48 pm CEST | Monday, September 2, 2024

02.09.2024

Or, taking the dates of the following eclipses:

06/09/1755	9.05	Eclisse totale.	Meridionale	5.40	18.36

Let's add two synodic months:

September 6, 1755 + 59 days 1 hour 28 minutes 6 seconds

Input interpretation

Saturday, September 6, 1755 + 59 days 1 hour 28 minutes 6 seconds

Result

1:28:06 am LMT | Tuesday, November 4, 1755

04.11.1755

And from the following date:

02/10/2024	19.46	Eclisse anulare.	Meridionale	6.08	17.49

Subtracting a synodic month:

October 2, 2024 - 29 days 12 hours 44 minutes 3 seconds

Input interpretation

Wednesday, October 2, 2024 – 29 days 12 hours 44 minutes 3 seconds

Result

11:15:57 am CEST | Monday, September 2, 2024

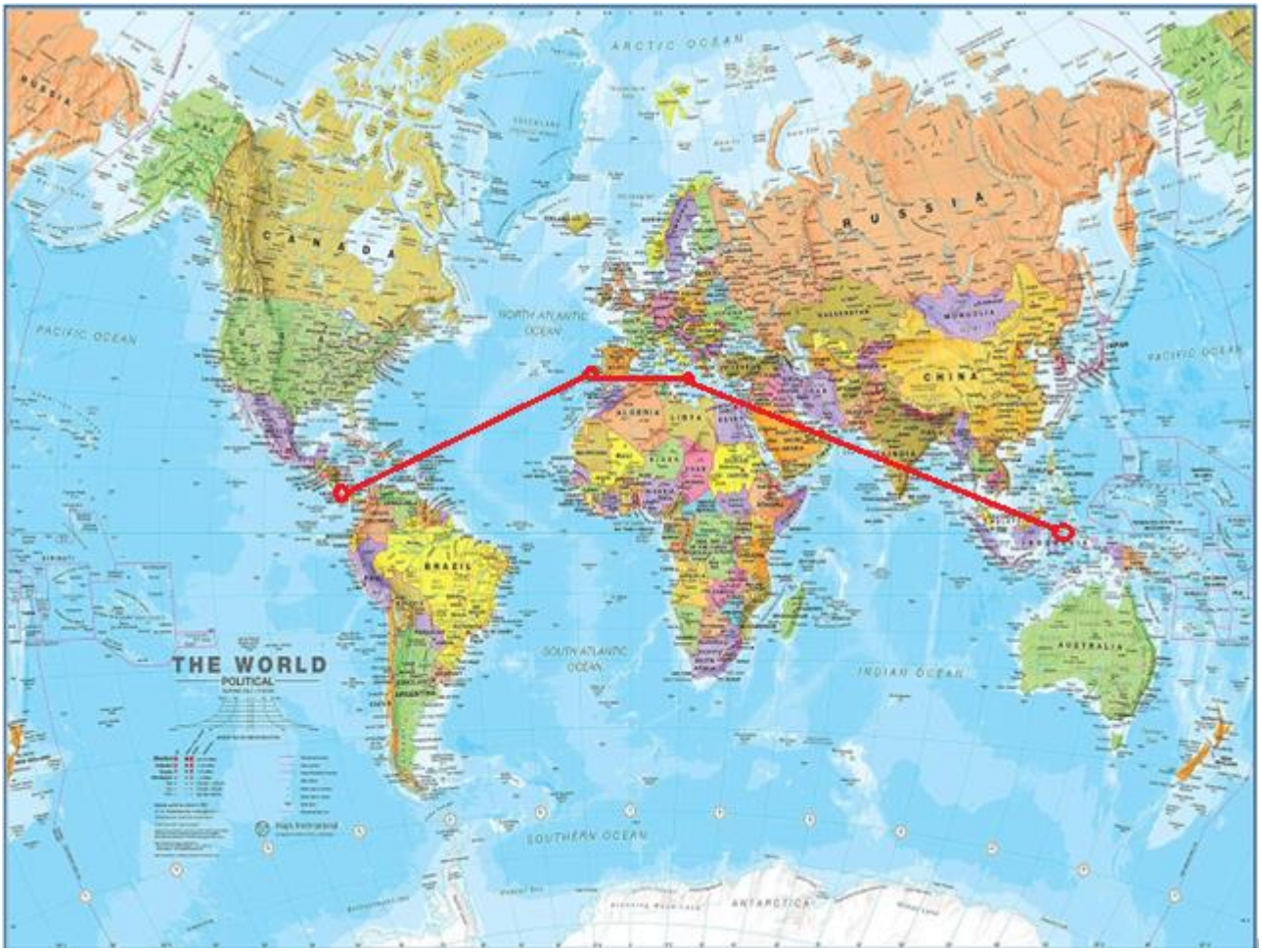
02.09.2024

August 26, 2024

An earthquake measuring 5.3 on the Richter scale was recorded in the early hours of this morning off the coast of the city of Sines, and the tremor was also felt in Lisbon. According to data from the Portuguese Institute of the Sea and the Atmosphere (IPMA), the earthquake had its epicenter in the Atlantic, 70 km southwest of Sesimbra. According to the Portuguese institute, the tremor was felt in Portugal, Spain and Morocco. “Three other aftershocks of the earthquake felt at 5:11 have already been felt, with values of 1.2, 1.1 and 0.9 on the Richter scale,” said André Fernandes, national commander of the Civil Protection. “It is a perfectly normal situation and we are now in a monitoring phase.”

Data e Ora (Italia)	**Magnitudo**	**Zona**
2024-08-27 14:47:43	ML 3.9	Mar Ionio Settentrionale (MARE)
2024-08-27 05:39:49	ML 2.9	Tirreno Meridionale (MARE)
2024-08-27 04:15:20	**Mwp 5.8**	**Indonesia [Sea]**
2024-08-26 15:14:15	ML 2.1	4 km SW Serravalle di Chienti (MC)
2024-08-26 11:47:42	ML 2.3	3 km SE Fontanelice (BO)
2024-08-26 07:08:45	**Mwp 5.8**	**South of Panama [Sea: Panama]**
2024-08-26 06:34:38	ML 2.0	3 km W Apricena (FG)
2024-08-26 06:11:38	**mb 5.0**	**Portugal [Sea]**
2024-08-26 03:34:32	ML 2.2	4 km SE Castel del Rio (BO)
2024-08-26 03:05:44	ML 2.0	Confine Italia Svizzera (SVIZZERA)
2024-08-26 02:02:06	ML 2.4	Borgo Tossignano (BO)

Data e Ora (Italia)	Magnitudo	Zona
2024-08-26 01:53:02	ML 2.3	2 km N Borgo Tossignano (BO)
2024-08-26 01:45:43	ML 3.9	3 km SE Castel del Rio (BO)
2024-08-26 01:29:09	**Mwp 6.8**	**Tonga Islands [Sea: Tonga]**



On **February 16, 1861**, there was a very violent earthquake in Sumatra, Indonesia. These are the lunar phases of that period:

9 February 1861 20:04:38 New Moon 21°07'47 396863.84 km

18 February 1861 00:19:42 First Quarter 29°23'17 398290.59 km

A tale data aggiungiamo 1 Ciclo di Saros e sottraiamo 2 mesi sinodici:

february 16, 1861 + 108 years 68 days 4 hours 12 minutes - 58.54 days

Input interpretation

(Saturday, February 16, 1861 + 108 years 68 days 4 hours 12 minutes) –
58.540 days

Result

3:14:24 pm CET | Tuesday, February 25, 1969

This date (February 25, 1969) is very close to the date of **February 28, 1969**, when there was a strong earthquake that hit Portugal and Morocco.

March 4, 1969 05:17:03 Full Moon 13°27'39 387679.14 km

Let's add to this date 3 Saros cycles:

February 25, 1969+54 years 34 days 2 hours 6 minutes

Input interpretation

Tuesday, February 25, 1969 + 54 years 34 days 2 hours 6 minutes

Result

2:06 am CEST | Friday, March 31, 2023

We note that:

20/04/2023	5.24	Eclisse totale.	Meridionale	5.23	18.56

Adding to the date obtained above 5 synodic months:

March 31, 2023 + 146 days 8 hours 24 minutes

Input interpretation

Friday, March 31, 2023 + 146 days 8 hours 24 minutes

Result

8:24 am CEST | Thursday, August 24, 2023

To that date, adding 1 lunar year, we get:

August 24, 2023 + 354 days 8 hours 48 minutes 36 seconds

Input interpretation

Thursday, August 24, 2023 + 354 days 8 hours 48 minutes 36 seconds

Result

8:48:36 am CEST | Monday, August 12, 2024

Doing the same calculation with the date of the eclipse:

April 20, 2023 + 146 days 8 hours 24 minutes

Input interpretation

Thursday, April 20, 2023 + 146 days 8 hours 24 minutes

Result

8:24 am CEST | Wednesday, September 13, 2023

Adding to this date a synodic year:

September 13, 2023 + 354 days 8 hours 48 minutes 36 seconds

Input interpretation

Wednesday, September 13, 2023 + 354 days 8 hours 48 minutes 36 seconds

Result

8:48:36 am CEST | Sunday, September 1, 2024

Both dates, **August 12** and **September 1, 2024**, are close to **August 26, 2024**, the date of the 5.3 magnitude earthquake that occurred in Portugal.

August 26, 2024 09:25:50 Last quarter 03°38'10 376666.64 km

September 3, 2024 01:55:34 New Moon 11°04'12 403894.36 km

Let's go back to the date of November 1, 1755 (Lisbon Earthquake). Here is the lunar phase of that period:

November 4, 1755 03:08:41 New Moon 11°24'50 356902.18 km

Let's add to it 5 Saros cycles:

November 1, 1755 + 90 years 56 days 19 hours 30 minutes

Input interpretation

Saturday, November 1, 1755 + 90 years 56 days 19 hours 30 minutes

Result

7:30 pm LMT | Saturday, December 27, 1845

Adding 1 Saros cycle to the result obtained:

December 27, 1845 + 18 years, 11 days, 8 hours and 42 minutes

Input interpretation

Saturday, December 27, 1845 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am LMT | Thursday, January 7, 1864

Subtracting 3 synodic years from the above result, we obtain:

January 7, 1864 - 1063 days 2 hours 25 minutes 48 seconds

Input interpretation

Thursday, January 7, 1864 – 1063 days 2 hours 25 minutes 48 seconds

Result

9:34:12 pm LMT | Thursday, February 7, 1861

Result close to the date of **February 16, 1861**, in which there was a very violent earthquake in Sumatra (Indonesia)

February 9, 1861 20:04:38 New Moon 21°07'47 396863.84 km

February 18, 1861 00:19:42 First quarter 29°23'17 398290.59 km

Let's now analyze these additional earthquakes, which occurred close to eclipse dates, in the Urbino area (Marche):

14/04/1828	10.24	Eclisse totale.	Settentrionale	5.32	18.50

1828. ***Aprile, notte dal 13 al 14.*** **Fortissimo.**

01/02/1851	6.57	Eclisse anulare.	Meridionale	7.24	17.25

1851. ***11 Febbraio.*** **Il conte Domenico Paoli da Pesaro mi scrisse che ivi ebbero a ore 5. 11' circa (credo pomeridiane) una piccola scossa di terremoto.**

1851. ***28 Maggio, 9 pom.*** **Terremoto della vigilia dell'Ascensione. Fu sentito anche a Cortona e a Castiglione (presso Cortona) qualche minuto prima delle 9 pom., nella direzione da N a S, e con mediocre intensità. Lo sentirono anche Siena, Firenze, Lucca.**

06/06/1853	21.07	Eclisse anulare.	Meridionale	4.35	19.42

1853. *22 Giugno, 0. 28' ant.* Assai gagliardo.

26/05/1854	21.46	Eclisse anulare.	Settentrionale	4.41	19.33

1854. *22 Maggio, 3. 36' pom.* Due leggiere scosse di 2" l'una, coll'intervallo di forse 2". Qualcuno crede aver notata la direzione verso NE.

1854. *16 Giugno, 2. 31' pom.* Terremoto per circa 8" ondulatorio per SW-NE. È cominciato con movimento sussultorio, e poi un momento quietò, e poi riprese per 2" o 3. Il vento SW rinforzò dopo il terremoto. È stato sentito anche a Bologna.

29/09/1856	4.58	Eclisse anulare.	Settentrionale	6.05	17.55

1856. *31 Agosto, 3. 37' ant.* Terremoto piuttosto lungo da E a W. Il barometro è alto, e alza sempre più.

1856. *12 Ottobre, 2. 0 ant.* Prolungato, ma non forte.

25/03/1857	23.30	Eclisse totale.	Meridionale	6.05	18.28
18/09/1857	6.36	Eclisse anulare.	Settentrionale	5.53	18.15

1857. *15 Marzo, 6. 45' (ant.?).* Scossa ondulatoria sentita da parecchi da E a W.

1857. *3 Settembre, 5. 0 ant.* Ondulatorio.

18/07/1860	15.24	Eclisse totale.	Settentrionale	4.50	19.41

1860. *15 Luglio, 2. 3/4 ant.* Cinque piccole ondulazioni.

31/12/1861	14.50	Eclisse totale.	Settentrionale	7.38	16.49

1861. *7 Dicembre, 10. 1/2 ant.* Prima scossa per 4 secondi, che ha fatto sonare qualche campanello; ondulatoria, nella direzione probabile da E a W, seguita da una seconda assai più debole.

1861. *8 Dicembre, 5. 1/2 ant.* Si ripete un piccolo terremoto. È curioso che questa ripetizione si fa in ordine al tempo come nel marzo.

19/10/1865	17.21	Eclisse anulare.	Settentrionale	6.27	17.23

1865. *24 Settembre, 11. 1/2 ant.* Piuttosto forte, ma breve.

06/03/1867	10.48	Eclisse anulare.	Settentrionale	6.38	18.06

1867. *29 Marzo, 7. 25' pom.* Urto assai violento, seguito da un nuovo urto più debole; e poi agitazione vaga crescente per circa 5''. La direzione prevalente sembrò da W a E.

1867. *30 Marzo, 4. 10' ant.* Altra minima scossa sentita da pochi.

18/08/1868	6.12	Eclisse totale.	Meridionale	5.21	19.05

1868. *2 Agosto, 10. 15' pom.* Lieve.

1868. *26 Agosto, 8. 42' ant.* Ondulatorio per 8", con piccola tregua dopo i primi quattro.

31/01/1870	16.31	Eclisse parziale. Magnitud. = 0,47	Meridionale	7.24	17.24
29/06/1870	0.45	Eclisse parziale. Magnitud. = 0,64	Meridionale	4.37	19.49
22/12/1870	13.31	Eclisse totale.	Settentrionale	7.35	16.43

1870. *8 Febbraio, 5. o pom. circa.* Forte scossa preceduta da romba sotterranea. Ha fatto sonare qualche campanello.

1870. *1 Marzo, 8. 40' pom.* Due scosse assai sensibili.

1870. *24 Giugno, 6. o pom. circa.* Due scosse ondulatorie; la prima leggiera, la seconda più sensibile, però avvertite da pochi.

1870. *21 Novembre, 0. 15' ant.* Ondulatorio.

22/12/1870	13.31	Eclisse totale.	Settentrionale	7.35	16.43

1871. *6 Gennaio, 11. o pom. circa.* Terremoto.

18/06/1871	3.34	Eclisse anulare.	Meridionale	4.34	19.48

1871. *2 Giugno, 10. 45' pom.* Terremoto.

30/11/1872	19.26	Eclisse totale.	Meridionale	7.18	16.40

1872. *2 Novembre, 1. 26' pom.* Due scosse ondulatorie, con un minuto d'intervallo. La prima più forte durò circa 6", la seconda circa 4".

26/05/1873	10.13	Eclisse parziale. Magnitud. = 0,89	Settentrionale	4.40	19.34

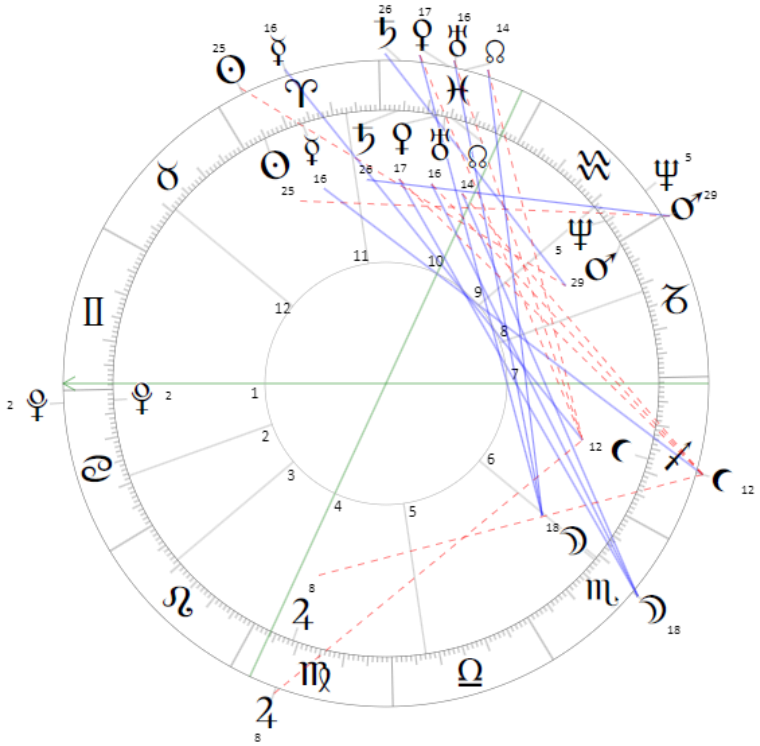
1873. *7 Maggio, 8. 11' ant.* Lieve scossa sentita da pochissimi. Alla stessa ora fu sentito distintamente a Cagli.

1873. *20 Maggio, 4. 45' ant.* A Macerata (Marche) forte scossa, ma di breve durata.

April 14, 1672 strong earthquake in Rimini

28/02/1672	15.51	Eclisse anulare.	Meridionale	6.48	17.59

March 6, 1672 → Jupiter opposition



Luna → Urano-Venere

April, 14 1672 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Thursday, April 14, 1672 (Gregorian calendar) +
108 years 68 days 4 hours 12 minutes

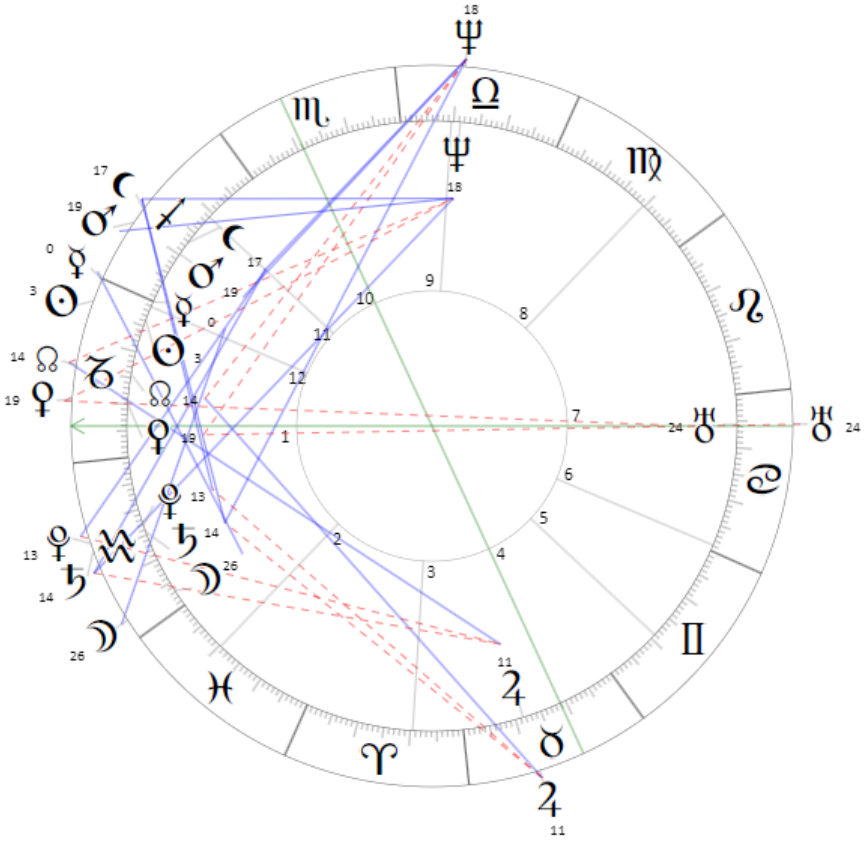
Result

4:12 am LMT | Wednesday, June 21, 1780

December 25, 1786 strong earthquake in Rimini

20/12/1786	18.03	Eclisse parziale. Magnitud. = 0,07	Meridionale	7.34	16.42

January 4, 1787 - Inferior Conjunction of Venus



Luna → Plutone-Saturno ; Giove → Venere ; Urano → Venere ; Nettuno → Venere

Giove → Urano → Nettuno → Venere

December 25, 1786 + 108 years 68 days 4 hours 12 minutes

Input interpretation

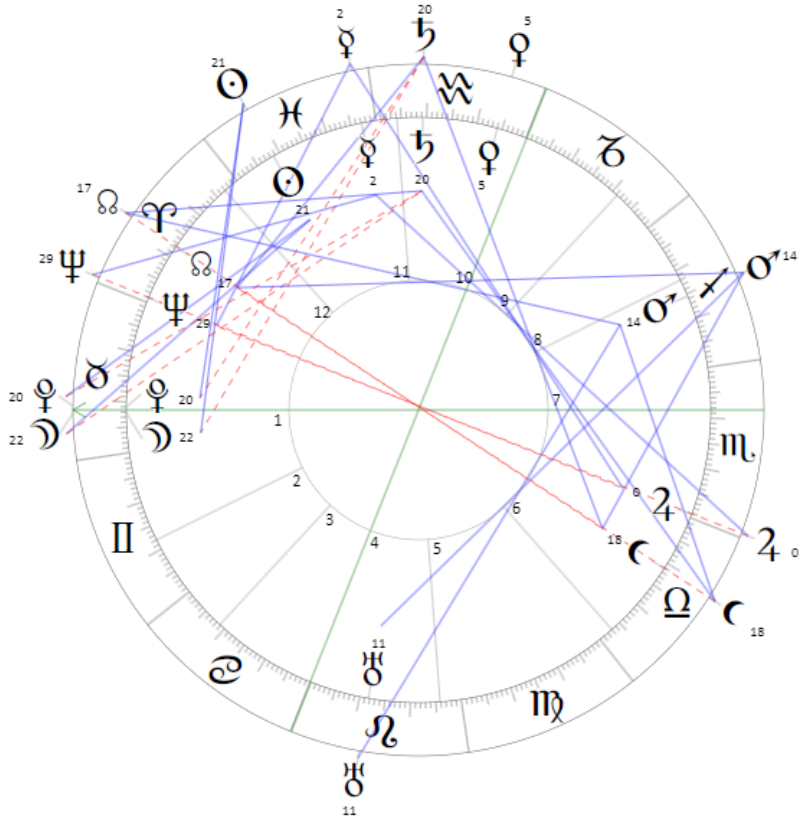
Monday, December 25, 1786 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CET | Sunday, March 3, 1895

March 12, 1875 strong earthquake in Rimini

06/04/1875	7.37	Eclisse totale.	Meridionale	5.45	18.40



Saturno → Luna ; Giove → Nettuno

March, 12 1875 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Friday, March 12, 1875 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Thursday, May 19, 1983

April, 14 1672 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Thursday, April 14, 1672 (Gregorian calendar) +
108 years 68 days 4 hours 12 minutes

Result

4:12 am LMT | Wednesday, June 21, 1780

June 21, 1780 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Wednesday, June 21, 1780 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am RMT | Tuesday, August 28, 1888

August 28, 1888 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Tuesday, August 28, 1888 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CET | Monday, November 4, 1996

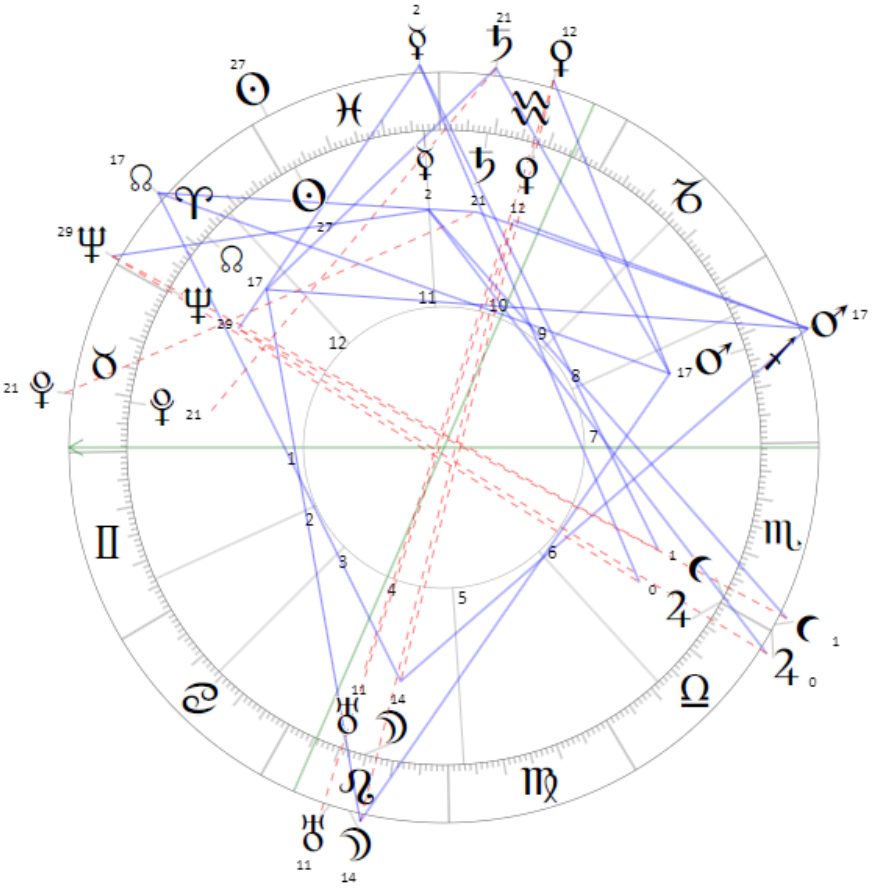
On the earthquake of March 17-18, 1875

Moon phases:

March 14, 1875 13:05:40 First quarter 23°34'14 373234.63 km

March 21, 1875 23:51:50 Full Moon 00°58'17 398418.84 km

Transit sky of Thursday, March 18, 1875 at 08:00:00, Rome, Italy



Venere-Luna ; Giove-Nettuno ; Mercurio-Giove ; Venere-Urano

Mercurio-Saturno-Giove; → Venere-Luna-Urano ; Mercurio-Saturno-Giove

Lisbona 38°42′N 9°11′W

Sumatra 3°35′N 98°40′E

Rimini 44°03′34″N 12°34′06″E

2*(23°34'14")-2((2sqrt2)/Pi)°

Input interpretation

$$2\,(23\text{ degrees}\quad 34\text{ arcminutes}\quad 14\text{ arcseconds}) - 2\times\frac{2\sqrt{2}}{\pi}\,^\circ\ \text{(degrees)}$$

Results

45 degrees 20 arcminutes 25.72 arcseconds

1/2(23°34'14")+((2√2)/Pi)°

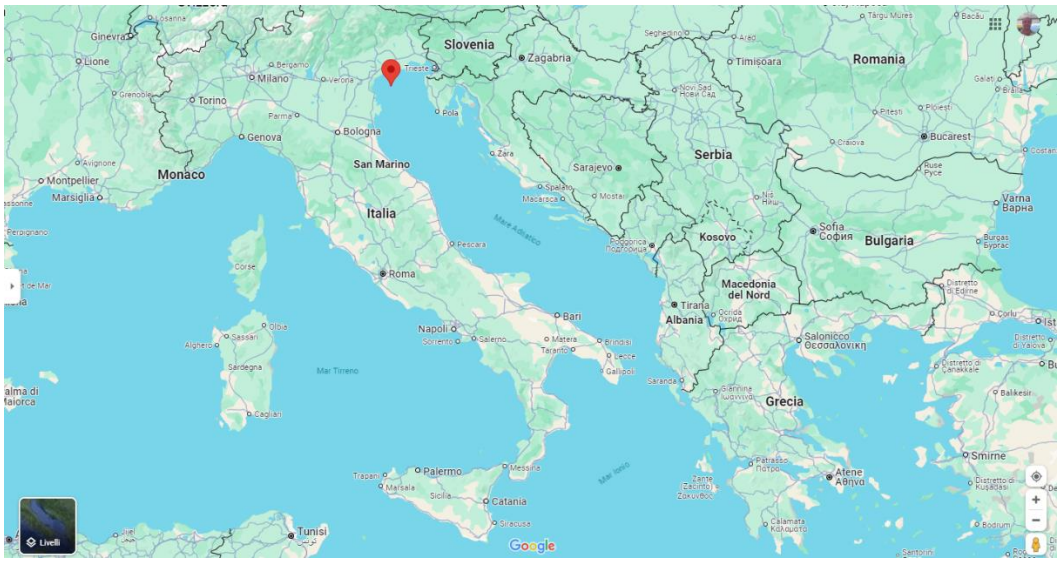
Input interpretation

$$\frac{1}{2}\,(23\text{ degrees}\quad 34\text{ arcminutes}\quad 14\text{ arcseconds}) + \frac{2\sqrt{2}}{\pi}\,^\circ\ \text{(degrees)}$$

Results

12 degrees 41 arcminutes 8.139 arcseconds

45°20'00.0"N 12°41'00.0"E (sea in front of Jesolo)



((29° 23') - (21° 07'))/2 - ((2sqrt2)/Pi)°

Input interpretation

$$\frac{1}{2}(29\text{ degrees }\ 23\text{ arcminutes} - 21\text{ degrees }\ 7\text{ arcminutes}) - \frac{2\sqrt{2}}{\pi}° \text{ (degrees)}$$

Results

3 degrees 13.98 arcminutes

2((29° 23') + (21° 07'))-((2sqrt2)/Pi)°

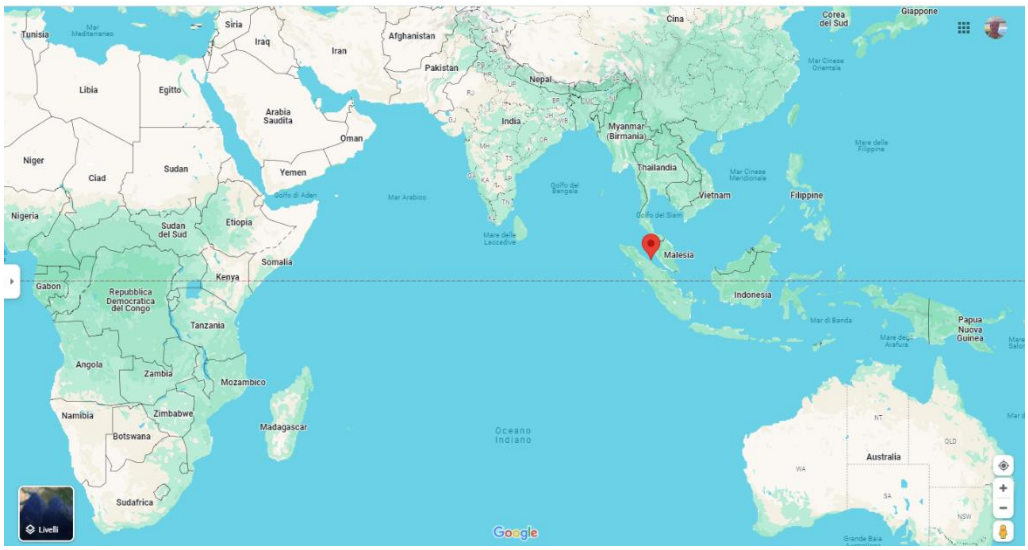
Input interpretation

$$2(29\text{ degrees }\ 23\text{ arcminutes} + 21\text{ degrees }\ 7\text{ arcminutes}) - \frac{2\sqrt{2}}{\pi}° \text{ (degrees)}$$

Results

100 degrees 5.981 arcminutes

3°14'00.0"N 100°06'00.0"E (Straits of Malacca)



3*(11°24')+5((2sqrt2)/Pi)°

Input interpretation

$$3\,(11 \text{ degrees } \ 24 \text{ arcminutes}) + 5\times\frac{2\sqrt{2}}{\pi}\,^\circ \text{ (degrees)}$$

Results

38 degrees 42.09 arcminutes

(11°24')-2((2sqrt2)/Pi)°

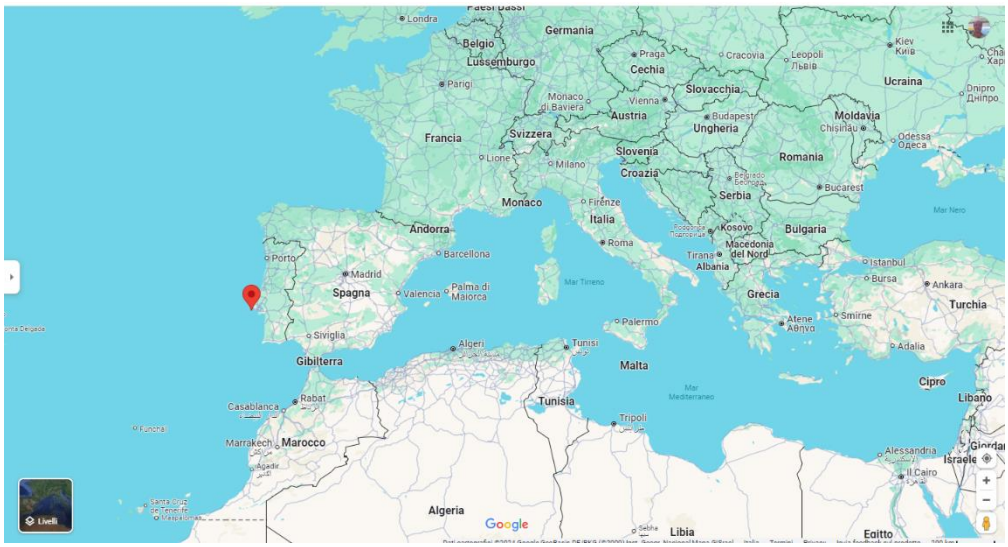
Input interpretation

$$11 \text{ degrees } \ 24 \text{ arcminutes} - 2\times\frac{2\sqrt{2}}{\pi}\,^\circ \text{ (degrees)}$$

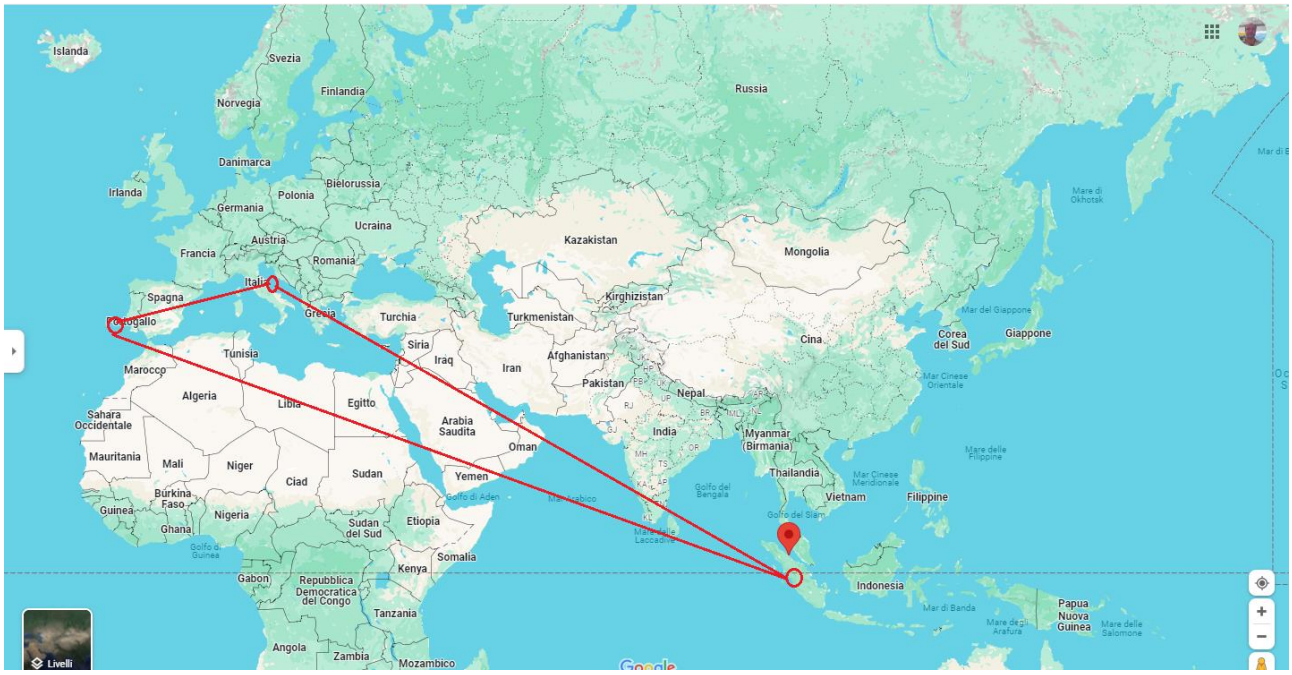
Results

9 degrees 35.96 arcminutes

38°42'00.0"N 9°36'00.0"W North Atlantic Ocean (off Lisbon)



Calculated seismic radiant map



Real seismic events map

We note that from the previous three expressions, we obtain:

2*(23°34'14")-2((x))° = 45.34°

Input interpretation

$$2\,(23 \text{ degrees } 34 \text{ arcminutes } 14 \text{ arcseconds}) - 2\times x° \text{ (degrees)} = 45.34° \text{ (degrees)}$$

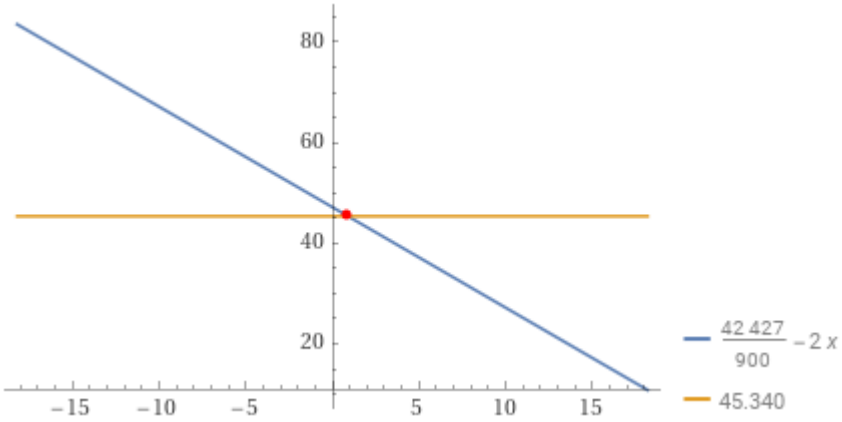
Result

$$\frac{1}{3600}\left(60\,\text{int}\left(60\,\text{frac}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right) + \text{int}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right)\right) + \text{frac}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right)\right) + 3600\,\text{int}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right) = 45.340$$

frac(x) is the fractional part function

int(x) is the integer part function

Plot



Alternate form assuming x is real

$$2.000\,x = 1.801$$

Alternate forms

$$\frac{42\,427}{900} - 2\,x = 45.340$$

$$60.00\,\text{int}\left(60\,\text{frac}\left(\frac{1}{900}\,(42\,427 - 1800\,x)\right)\right) + 1.0000\,\text{int}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{1}{900}\,(42\,427 - 1800\,x)\right)\right)\right) + 1.0000\,\text{frac}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{1}{900}\,(42\,427 - 1800\,x)\right)\right)\right) + 3600.0\,\text{int}\left(\frac{1}{900}\,(42\,427 - 1800\,x)\right) = 1.6322\times 10^5$$

Expanded forms

$$\frac{1}{60}\,\text{int}\left(60\,\text{frac}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right) + \frac{\text{int}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right)\right)}{3600} + \frac{\text{frac}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right)\right)}{3600} + \text{int}\left(\frac{169\,708 - 7200\,x}{3600}\right) = 45.340$$

$$\frac{1}{60}\,\text{int}\left(60\,\text{frac}\left(\frac{42\,427}{900}-2x\right)\right)+\frac{\text{int}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{42\,427}{900}-2x\right)\right)\right)}{3600}+\frac{\text{frac}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{42\,427}{900}-2x\right)\right)\right)}{3600}+\text{int}\left(\frac{42\,427}{900}-2x\right)=45.340$$

Solution

$x \approx 0.90034$

0.90034

From which:

1/3*(2/0.90034)^2

Input

$$\frac{1}{3}\left(\frac{2}{0.90034}\right)^2$$

Result

1.64484752654655897587392701108220807517046360481678116844239939 87
…

1.644847526546…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

(1/3*(2/0.90034)^2)^15-16-1/π

Input

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}$$

Result

1729.04…

1729.04….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2.

Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternative representations

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = -16 - \frac{1}{180^\circ} + \left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = -16 - -\frac{1}{i\log(-1)} + \left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = -16 - \frac{1}{\cos^{-1}(-1)} + \left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = 1729.36 - \frac{1}{4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = 1729.36 + \frac{1}{2 - 2\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = 1729.36 - \frac{1}{\sum_{k=0}^{\infty} \frac{2^{-k}\,(-6+50\,k)}{\binom{3k}{k}}}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = 1729.36 - \frac{1}{2\int_0^{\infty} \frac{1}{1+t^2}\,dt}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = 1729.36 - \frac{1}{4\int_0^{1} \sqrt{1-t^2}\,dt}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = 1729.36 - \frac{1}{2\int_0^{\infty} \frac{\sin(t)}{t}\,dt}$$

(1/27(((1/3*(2/0.90034)^2)^15-16-1/π)-1))^2-1/5

Input

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi}\right) - 1\right)\right)^2 - \frac{1}{5}$$

Result

4095.99…

4095.99…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192.

The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternative representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=$$
$$-\frac{1}{5}+\left(\frac{1}{27}\left(-17-\frac{1}{180^\circ}+\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=$$
$$-\frac{1}{5}+\left(\frac{1}{27}\left(-17--\frac{1}{i\log(-1)}+\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\right.$$
$$\left.-\frac{1}{5}+\left(\frac{1}{27}\left(-17-\frac{1}{\cos^{-1}(-1)}+\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}\right)\right)\right)^2\right.$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\right.$$
$$\left.-\frac{1}{5}+\frac{1}{729}\left(-1728.36+\frac{1}{\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50\,k)}{\binom{3k}{k}}}\right)^2\right.$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\right.$$
$$\frac{4097.5\left(-0.000145664+\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}\right)\left(-0.000143642+\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}\right)}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}\right)^2}$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\right.$$
$$\frac{4097.5\left(-1.00029+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)\left(-1.00029+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}{\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^2}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\frac{4097.5\left(-0.000291327+\int_0^\infty \frac{1}{1+t^2}\,dt\right)\left(-0.000287285+\int_0^\infty \frac{1}{1+t^2}\,dt\right)}{\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2}$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\frac{4097.5\left(-0.000291327+\int_0^\infty \frac{\sin(t)}{t}\,dt\right)\left(-0.000287285+\int_0^\infty \frac{\sin(t)}{t}\,dt\right)}{\left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^2}$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\frac{4097.5\left(-0.000145664+\int_0^1 \sqrt{1-t^2}\,dt\right)\left(-0.000143642+\int_0^1 \sqrt{1-t^2}\,dt\right)}{\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2}$$

((29° 23') - (21° 07'))/2 - (x)° = 3.233°

Input interpretation

$$\frac{1}{2}(29\text{ degrees }\ 23\text{ arcminutes} - 21\text{ degrees }\ 7\text{ arcminutes}) - x^\circ\ \text{(degrees)} = 3.233^\circ\ \text{(degrees)}$$

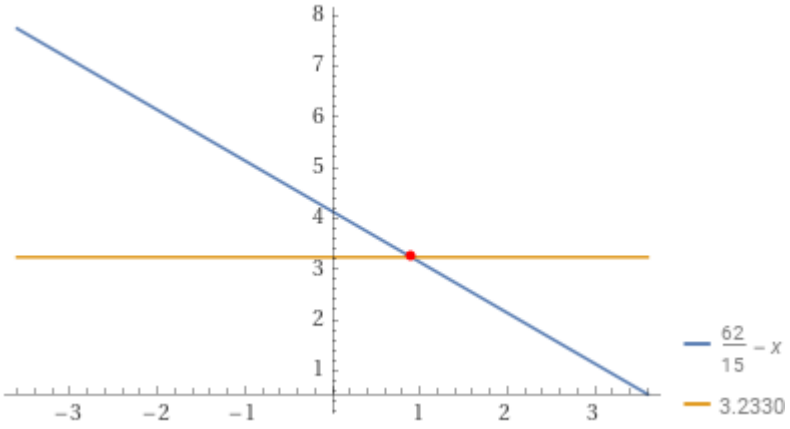
Result

$$\frac{1}{60}\left(\text{int}\left(60\,\text{frac}\left(\frac{1}{60}(248-60x)\right)\right)+\text{frac}\left(60\,\text{frac}\left(\frac{1}{60}(248-60x)\right)\right)+60\,\text{int}\left(\frac{1}{60}(248-60x)\right)\right)=3.2330$$

frac(x) is the fractional part function

int(x) is the integer part function

Plot



Alternate forms

$$\frac{62}{15} - x = 3.2330$$

$$1.0000\,\text{int}\left(60\,\text{frac}\left(\frac{1}{15}(62 - 15x)\right)\right) + 1.0000\,\text{frac}\left(60\,\text{frac}\left(\frac{1}{15}(62 - 15x)\right)\right) + 60.00\,\text{int}\left(\frac{1}{15}(62 - 15x)\right) = 193.98$$

Expanded forms

$$\frac{1}{60}\,\text{int}\left(60\,\text{frac}\left(\frac{1}{60}(248 - 60x)\right)\right) + \frac{1}{60}\,\text{frac}\left(60\,\text{frac}\left(\frac{1}{60}(248 - 60x)\right)\right) + \text{int}\left(\frac{1}{60}(248 - 60x)\right) = 3.2330$$

$$\frac{1}{60}\,\text{int}\left(60\,\text{frac}\left(\frac{62}{15} - x\right)\right) + \frac{1}{60}\,\text{frac}\left(60\,\text{frac}\left(\frac{62}{15} - x\right)\right) + \text{int}\left(\frac{62}{15} - x\right) = 3.2330$$

Solution

$x \approx 0.90032$

0.90032

From which:

1/3*(2/0.90032)^2

Input

$$\frac{1}{3}\left(\frac{2}{0.90032}\right)^2$$

Result

1.64492060570935150892172827686528811897691265235767865308994993 30
…

1.6449206057…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

(1/3*(2/0.90032)^2)^15-16-π/2

Input

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2}$$

Result

1728.95…

1728.95….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternative representations

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = -16 - 90^\circ + \left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = -16 + \frac{1}{2}\, i \log(-1) + \left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = -16 - E(0) + \left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$E(m)$ is the complete elliptic integral of the second kind with parameter $m = k^2$

Series representations

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = 1730.52 - 2\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = 1731.52 - \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = 1730.52 - \sqrt{3}\sum_{k=0}^{\infty} \frac{\left(-\frac{1}{3}\right)^k}{1+2k}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = 1730.52 - \int_0^\infty \frac{1}{1+t^2}\,dt$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = 1730.52 - 2\int_0^1 \sqrt{1-t^2}\,dt$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = 1730.52 - \int_0^\infty \frac{\sin(t)}{t}\,dt$$

(1/27(((1/3*(2/0.90032)^2)^15-16-π/2)-1))^2+1/5

Input

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2}\right) - 1\right)\right)^2 + \frac{1}{5}$$

Result

4095.97…

4095.97…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson.

This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternative representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=\frac{1}{5}+\left(\frac{1}{27}\left(-17-90^\circ+\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=\frac{1}{5}+\left(\frac{1}{27}\left(-17+\frac{1}{2}\,i\log(-1)+\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=\frac{1}{5}+\left(\frac{1}{27}\left(-17-E(0)+\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}\right)\right)^2$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$E(m)$ is the complete elliptic integral of the second kind with parameter $m = k^2$

Series representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=\frac{1}{5}+0.000342936\left(-3459.04+x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)^2 \quad \text{for } (x\in\mathbb{R} \text{ and } x>0)$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=\frac{1}{5}+0.000342936\left(-3459.04+\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50\,k)}{\binom{3\,k}{k}}\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=\frac{1}{5}+0.00137174\left(-1729.52+\sqrt{3}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{3}\right)^k}{1+2\,k}\right)^2$$

$\mathbb{R}$ is the set of real numbers

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=0.00137174\left(2.99139\times10^6-3459.04\int_0^{\infty}\frac{1}{1+t^2}\,dt+\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2\right)$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=0.00137174\left(2.99139\times10^6-3459.04\int_0^{\infty}\frac{\sin(t)}{t}\,dt+\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^2\right)$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=$$
$$0.00548697\left(747848.-1729.52\int_0^1\sqrt{1-t^2}\,dt+\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2\right)$$

3*(11°24')+5(x)° = 38.7°

Input interpretation

$$3\,(11\text{ degrees }\ 24\text{ arcminutes})+5\times x°\ \text{(degrees)}=38.7°\ \text{(degrees)}$$

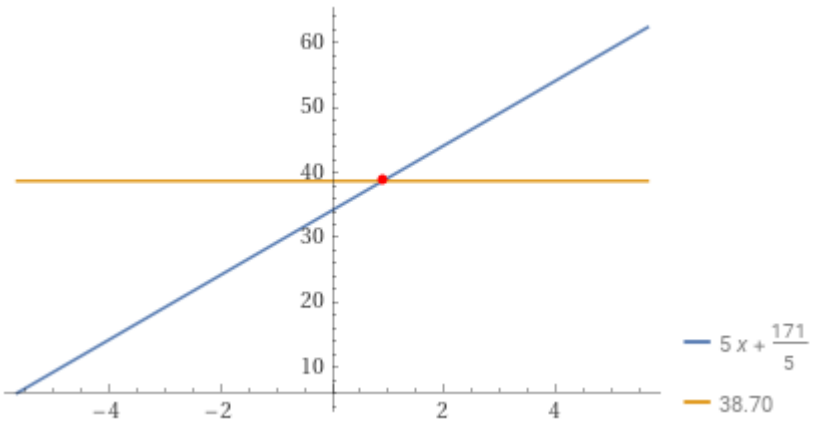
Result

$$\frac{1}{60}\left(\text{int}\left(60\,\text{frac}\left(\frac{1}{60}(300x+2052)\right)\right)+\text{frac}\left(60\,\text{frac}\left(\frac{1}{60}(300x+2052)\right)\right)+60\,\text{int}\left(\frac{1}{60}(300x+2052)\right)\right)=38.70$$

frac(x) is the fractional part function

int(x) is the integer part function

Plot



Alternate form assuming x is real

$$5.00\,x=4.50$$

Alternate forms

$$5x + \frac{171}{5} = 38.70$$

$$1.000\,\text{int}\left(60\,\text{frac}\left(\frac{1}{5}(25x + 171)\right)\right) + 1.000\,\text{frac}\left(60\,\text{frac}\left(\frac{1}{5}(25x + 171)\right)\right) + 60.00\,\text{int}\left(\frac{1}{5}(25x + 171)\right) = 2322.$$

Expanded forms

$$\frac{1}{60}\,\text{int}\left(60\,\text{frac}\left(\frac{1}{60}(300x + 2052)\right)\right) + \frac{1}{60}\,\text{frac}\left(60\,\text{frac}\left(\frac{1}{60}(300x + 2052)\right)\right) + \text{int}\left(\frac{1}{60}(300x + 2052)\right) = 38.70$$

$$\frac{1}{60}\,\text{int}\left(60\,\text{frac}\left(5x + \frac{171}{5}\right)\right) + \frac{1}{60}\,\text{frac}\left(60\,\text{frac}\left(5x + \frac{171}{5}\right)\right) + \text{int}\left(5x + \frac{171}{5}\right) = 38.70$$

Solution

$x \approx 0.9000$

0.9000

From which:

1/3*(2/0.9000)^2

Input

$$\frac{1}{3}\left(\frac{2}{0.9}\right)^2$$

Result

1.646090534979423868312757201646090534979423868312757201646090534 9

…

1.6460905349…. ≈ $\zeta(2) = \pi^2/6 = 1.644934$ (trace of the instanton shape and Ramanujan Recurring Number)

(1/3*(2/0.9000)^2)^15-34-2-1/π

Input

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi}$$

Result

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1728.93….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

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Alternative representations

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = -36 - \frac{1}{180^\circ} + \left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = -36 - -\frac{1}{i\log(-1)} + \left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = -36 - \frac{1}{\cos^{-1}(-1)} + \left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = 1729.25 - \frac{1}{4\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = 1729.25 + \frac{1}{2 - 2\sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = 1729.25 - \frac{1}{\sum_{k=0}^{\infty} \frac{2^{-k}\,(-6+50k)}{\binom{3k}{k}}}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = 1729.25 - \frac{1}{2\int_0^{\infty} \frac{1}{1+t^2}\,dt}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = 1729.25 - \frac{1}{4\int_0^1 \sqrt{1-t^2}\,dt}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = 1729.25 - \frac{1}{2\int_0^{\infty} \frac{\sin(t)}{t}\,dt}$$

(1/27(((1/3*(2/0.9000)^2)^15)-1))^2-144-29-Φ

Input

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15}-1\right)\right)^2-144-29-\Phi$$

Φ is the golden ratio conjugate

Result

4096.03…

4096.03…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

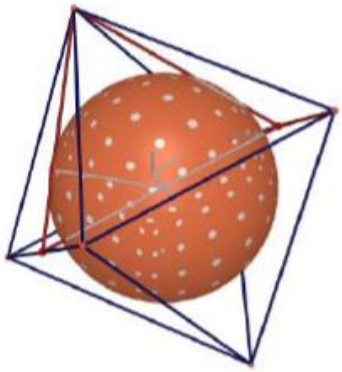


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.141939571526584308924330732196162632677513386811659044682541739 3

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

4096 = 64^2 , (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$).

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.6180\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^8\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^8\right)^k}{k!}\right)\quad\text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$
$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi e^{0} \approx 3.1416$ (real, principal root)

$\pi e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1 \sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003$ (real, principal root)

$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003$ (real root)

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\,\pi\left\lfloor\frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{8}{\pi^2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} = \sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\;\sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} = \sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\mathrm{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13
…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\Big/\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}(C\times \mathrm{R}\times 2.33\cdot 10^{-13})}}\cong 1.61803398\ldots=\frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.618035912348264235440174408834709854254527350840173356306481810 7

…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\, x^2\, y\, z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals (2√2)/π) is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over

time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and $R = 4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.6018401361\times 10^{-24}\right)}}$$

1.6180329973075324915067570166297467464225772608929671407919395903
…

1.6180329973075… result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times10^{-35}}{1.1056\times10^{-52}}\times 1729\times 4.4525642121\times10^{-24}\right)}}$$

Result

1.64493235210209213048389898370415116887662184165516687791416603 38…

1.64493235210209213…≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

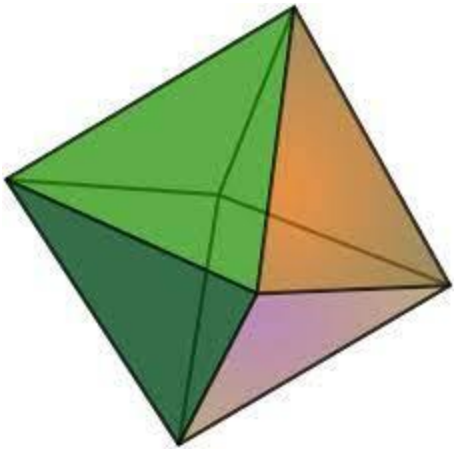
$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times10^{-35}}{1.1056\times10^{-52}}\times 1729\times 1.2206935225\times10^{-24}\right)}}$$

Result

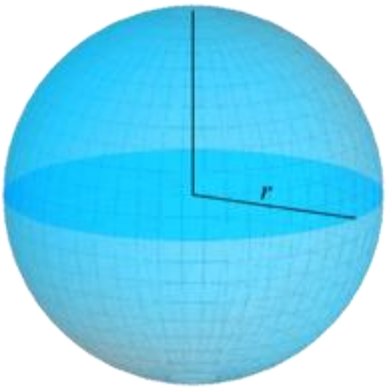
3.14159225731469939939950039231605796469731171781644423955790024797 …

3.14159225731469…. ≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find a, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

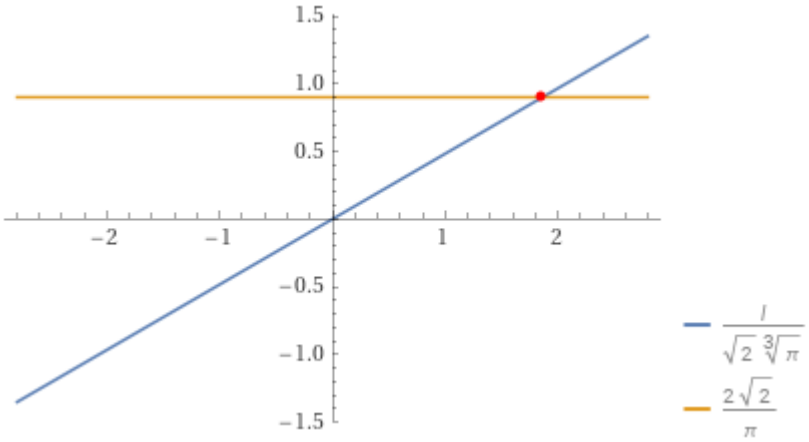
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,3}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **$f_0(1710)$ scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256x^8 + 95\,744x^7 - 3\,248\,750\,080x^6 - 914\,210\,725\,504x^5 + 15\,498\,355\,554\,921\,184x^4 + 2\,911\,478\,392\,539\,914\,656x^3 - 32\,941\,144\,911\,224\,677\,091\,680x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

$1.64381856858\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\wedge(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\wedge(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\wedge(1/15)\right)$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

–5.010882647757...

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+...}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\,\sqrt{6}}\right)^2\right\} = 0$$

$$\text{for } b = -\frac{226\,802\,245}{18\,480\,874}$$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

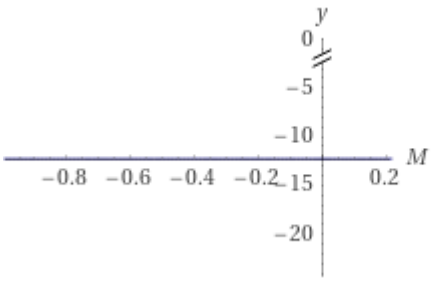
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

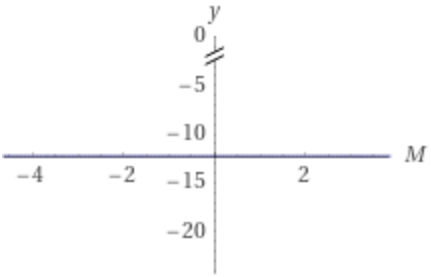
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V = \frac{1}{3}(0.0814845\,b + 1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

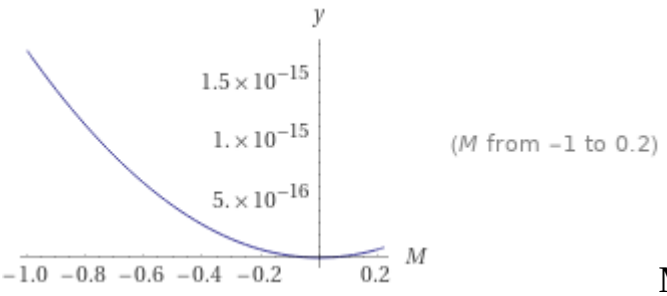
Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\,M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

Result:

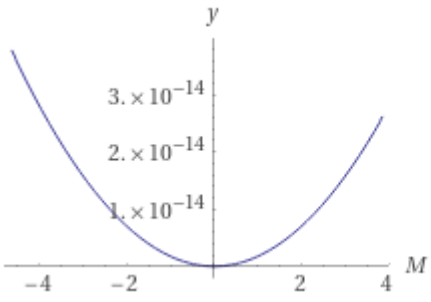
0

Plots: **(possible mathematical connection with an open string)**



M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O(M^{62194})$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{1}{3}M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2\left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^-16

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times10^{-17}$

7.021621519159*10^-17

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

$1.57986484181*10^{-14}$

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 2^2 + 6.58545 \times 10^{-10}\sqrt{2^4}\right)}{2^2} + 1\right)^2 \times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_{0}}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)])))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\,\hat{}\,(1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

$5.729475 * 10^{-35}$ Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

$1.820306 * 10^{61}$ V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

$5.975498*10^{-8}$ V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

$1.042940*10^{27}$ V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

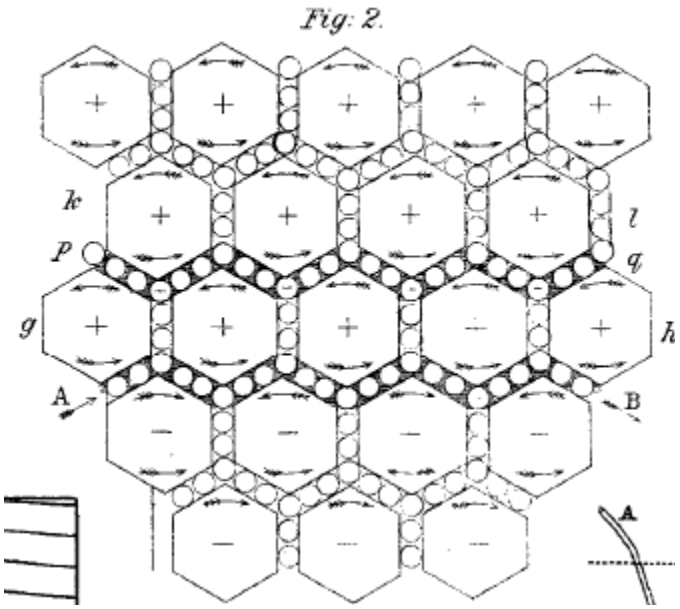
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

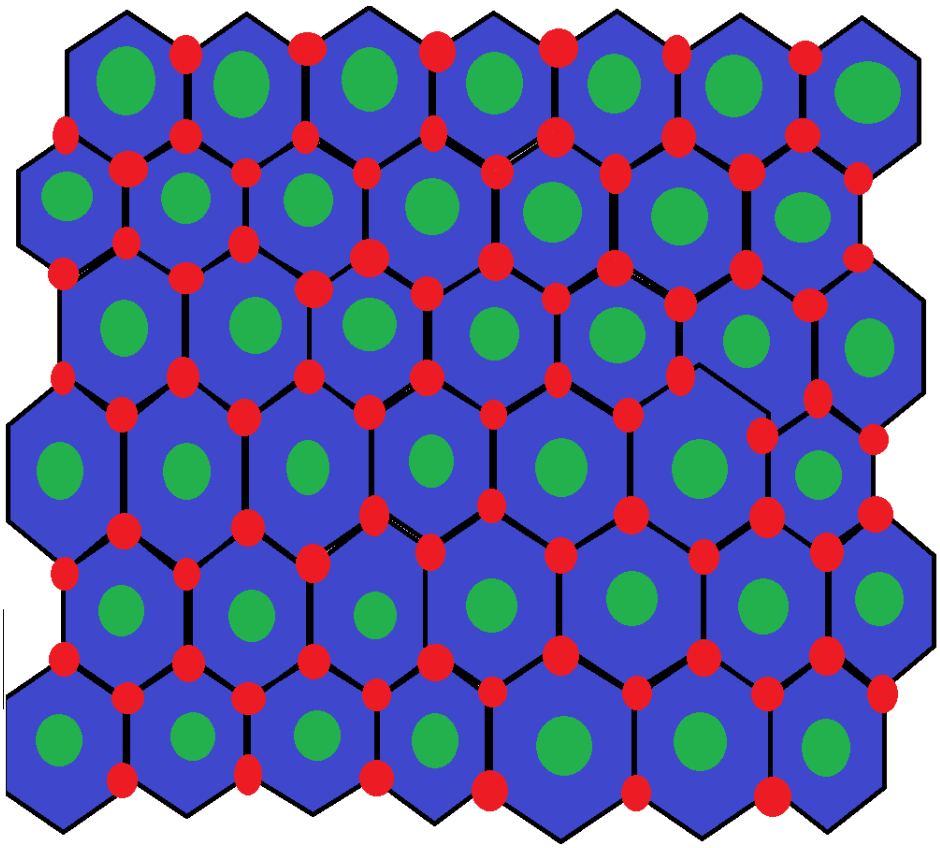
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

An Update on Brane Supersymmetry Breaking - *Jihad Mourad and Augusto Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On the study of various earthquakes, geophysical phenomena and related equations. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory IV

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper, (part IV) we analyze various earthquakes, geophysical phenomena and related equations. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory

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Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico

(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

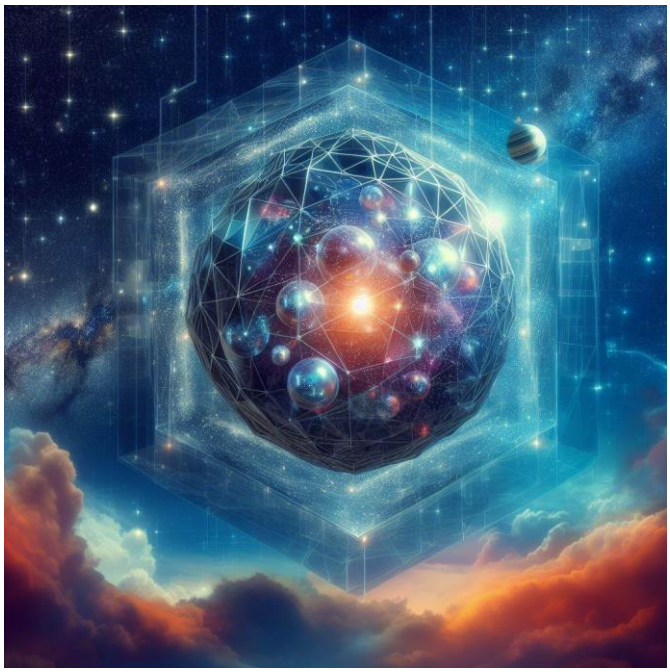
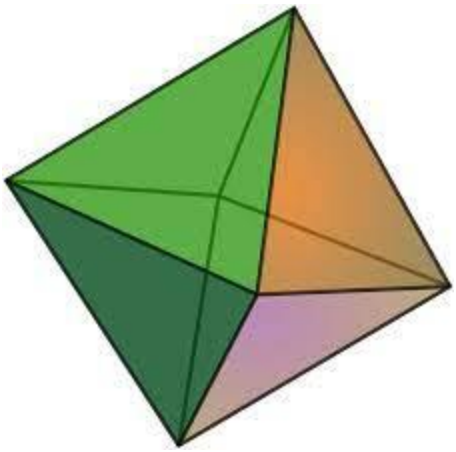
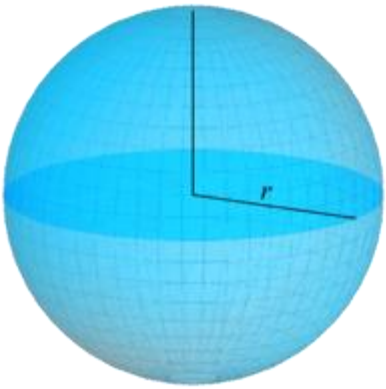


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\,\pi\,x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$$l = 0\,, \quad x = 0$$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi\,x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi\,x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

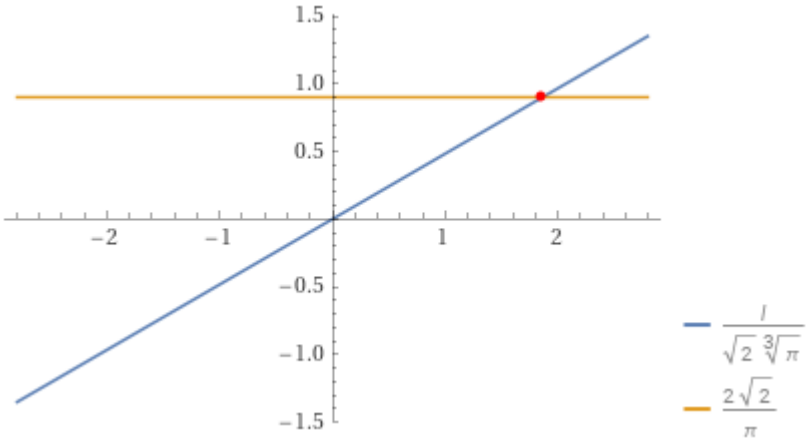
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

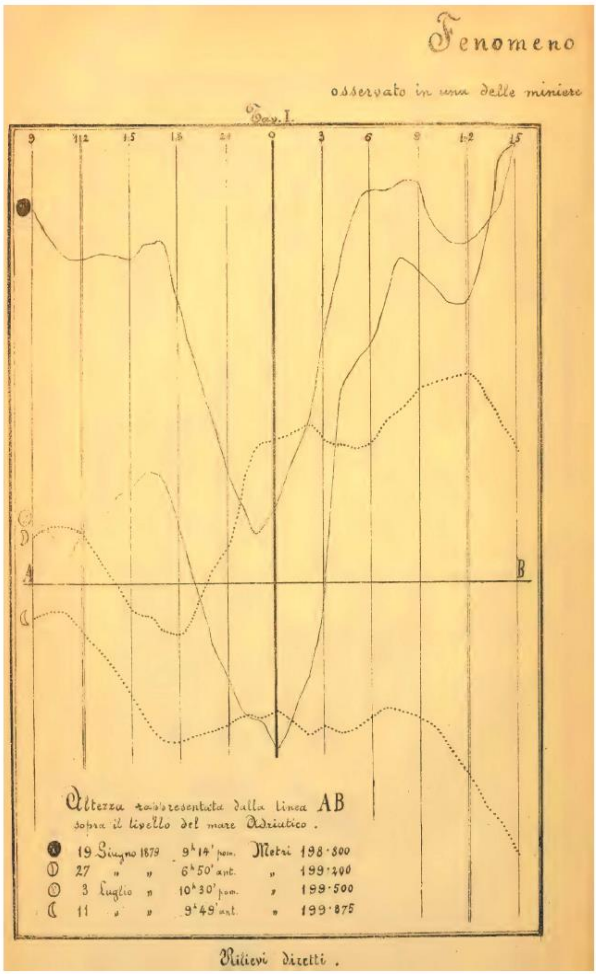
Plot

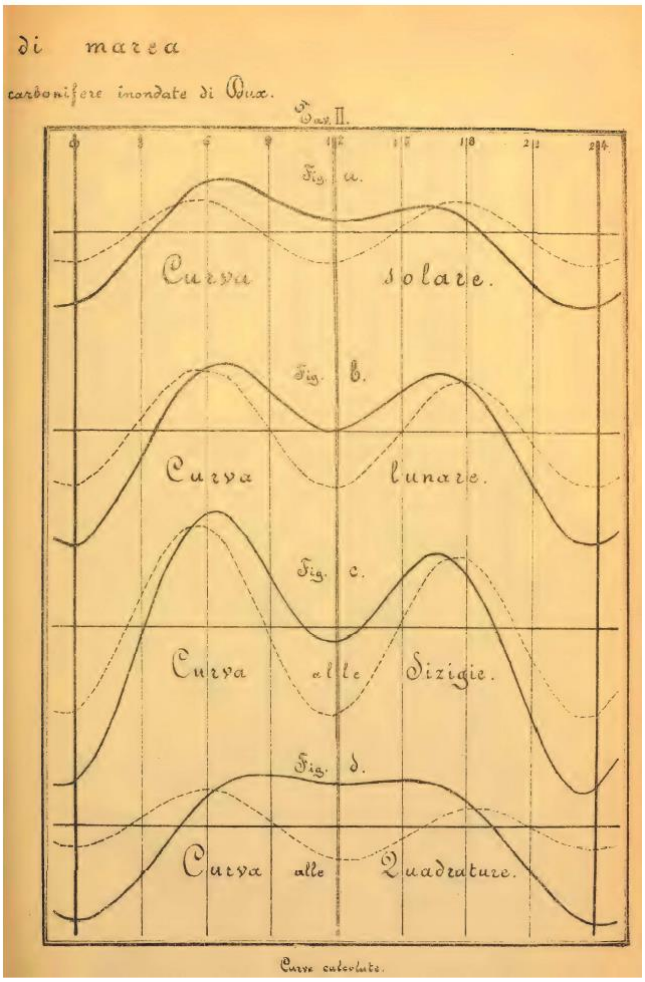


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·800
27 " " 6h 50' ant. " 199·290
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

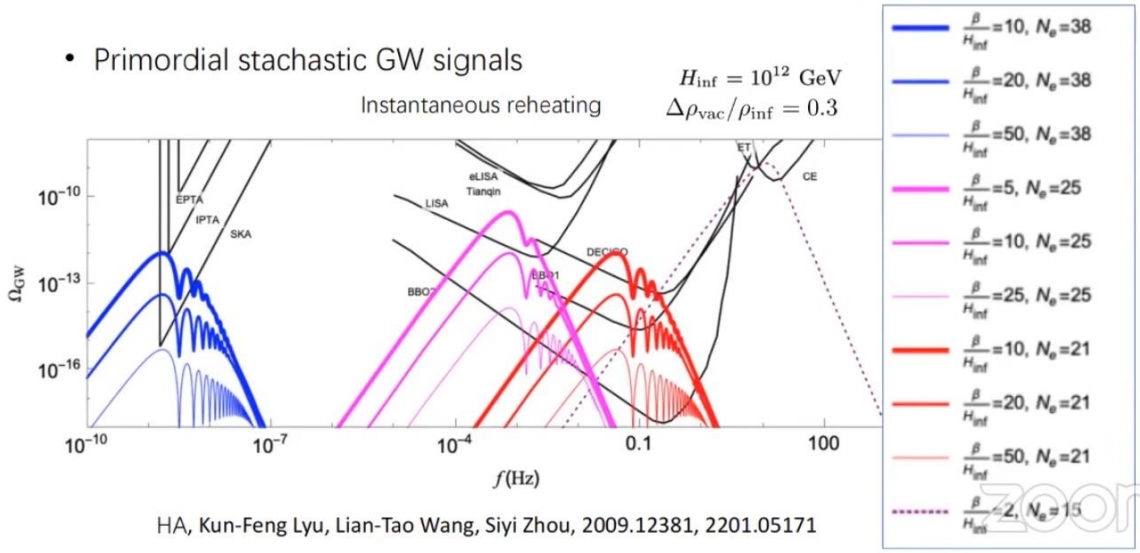

di marea
carbonifere inondate di Aux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating



HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

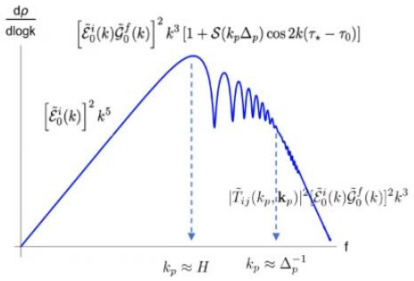
Comparison between primary GW and secondary GW

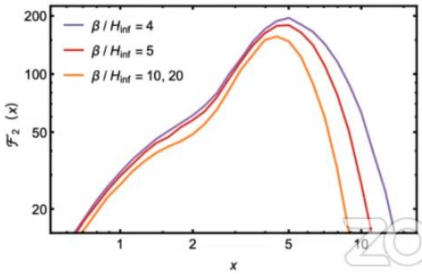
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





Observations on some seismic events: a possible mathematical model for a statistical prevision of the earthquake

Observations on the Earthquake of March 12, 1873 in Central Italy

Ragusa (Dalmazia) – Salisburgo – Aosta - Cosenza

Il fenomeno è passato. Ma quale ne fu la causa, quali le leggi, quali i precedenti, quali le conseguenze, quale l' ordine delle scosse, quali le influenze sugli animali? E poichè una scienza dei terremoti digià esiste, trova essa la scienza sismologica nel terremoto del 12 marzo 1873 nessun fenomeno che disveli nuove leggi o nuove qualità delle forze interiori del nostro pianeta, o che porti a sospettare nuove reciproche influenze tra le forze interne e le esterne atmosferiche o cosmiche? Quanti problemi in un solo fenomeno! Di tutti cercheremo la soluzione certa o probabile.

Adunque dove scoppiò la gran mina che la sera del 12 Marzo fe' traballare l' immenso quadrilatero che ha per suoi vertici Ragusa, Salisburgo, Aosta, Cosenza? E se non fu un' esplosione vulcanica nelle viscere del globo, ma piuttosto una bufera o marea d' irrequieti vapori o bollenti lave (terribili furie che abitano l' interno del nostro pianeta), dove percosse in prima quella bufera o marea?

On the Central Italy earthquake of 03.12.1873

« Sono circa le 9 di sera del giorno 12 marzo; un rombo si sente romoreggiare non sotterra, ma piuttosto per l'aria. Quest'urlo precursore fu sentito in qualche luogo anche dall'interno delle case, ma meglio e più forte fu avvertito nella campagna... Ché cosa è che lo produce? di dove viene? di sotterra od è nell'aria? A ciò il dotto P. Serpieri non risponde; e pensa che fosse nell'aria libera... Possiamo ammettere quale assioma, che il rombo, quando rombo v'è, è solito preannunciare l'arrivo imminente di un terremoto e talvolta si sente anche quando ha fatta la sua strage. »

« Questo rumore non era ancora cessato, che ad un tratto, appena battute le 9 di sera, una forte scossa smuoveva tutta quanta l'Italia da Cosenza a Belluno. Dove nacque quel terremoto? Come si estese? Ecco i quesiti a cui egregiamente rispose il chiarissimo P. Serpieri nel suo rapporto

penisola, e quindi venuta di fuori. Egli osserva inoltre che questa stessa onda si è spinta molto innanzi a tramontana ed a mezzogiorno, cioè ad Aosta e Cosenza; mentre il moto perpendicolare al primo corse verso le due spiagge marine, ma non discese e non salì molto nelle latitudini e con una bella figura rappresenta il terremoto come un grande e precipitoso fiume che ha corso da Cosenza ad Aosta o viceversa, e in mille punti ha rotto gli argini spingendosi con forti correnti a destra ed a sinistra ».

« Dalle notizie dall'egregio professore raccolte anzitutto appare che i moti geosismici hanno cominciato a manifestarsi sulla riva orientale dell'Adriatico, e che l'ora media del terremoto da Ragusa a Venezia (tempo di Roma) fu 9 ore 3′ 1/5, mentre le stazioni della penisola, tranne alcune centrali da Firenze a Spoleto hanno tutte un'ora superiore alle 9 ore 4′; ed inoltre i tempi vanno via alzandosi col crescere della latitudine. Difatti l'ora media in cui il terremoto si è fatto sentire nelle località seguenti, distanti l'una dall'altra circa un grado di latitudine è stata per

Ragusa-Sebenico	lat. med.	43°	19	ore	9, 0′ 2/5
Zara-Pola	»	44°	29	»	9, 2′ 1/5
Pisino-Trieste	»	45°	25	»	9, 5′ 3/10

« La progressione, scrive quindi il P. Serpieri, viene anche troppo bella e parlante. In poco più che 2′ le onde passarono dal grado 43 al 44 e nell'istesso tempo corsero dal grado 44 al 45. »

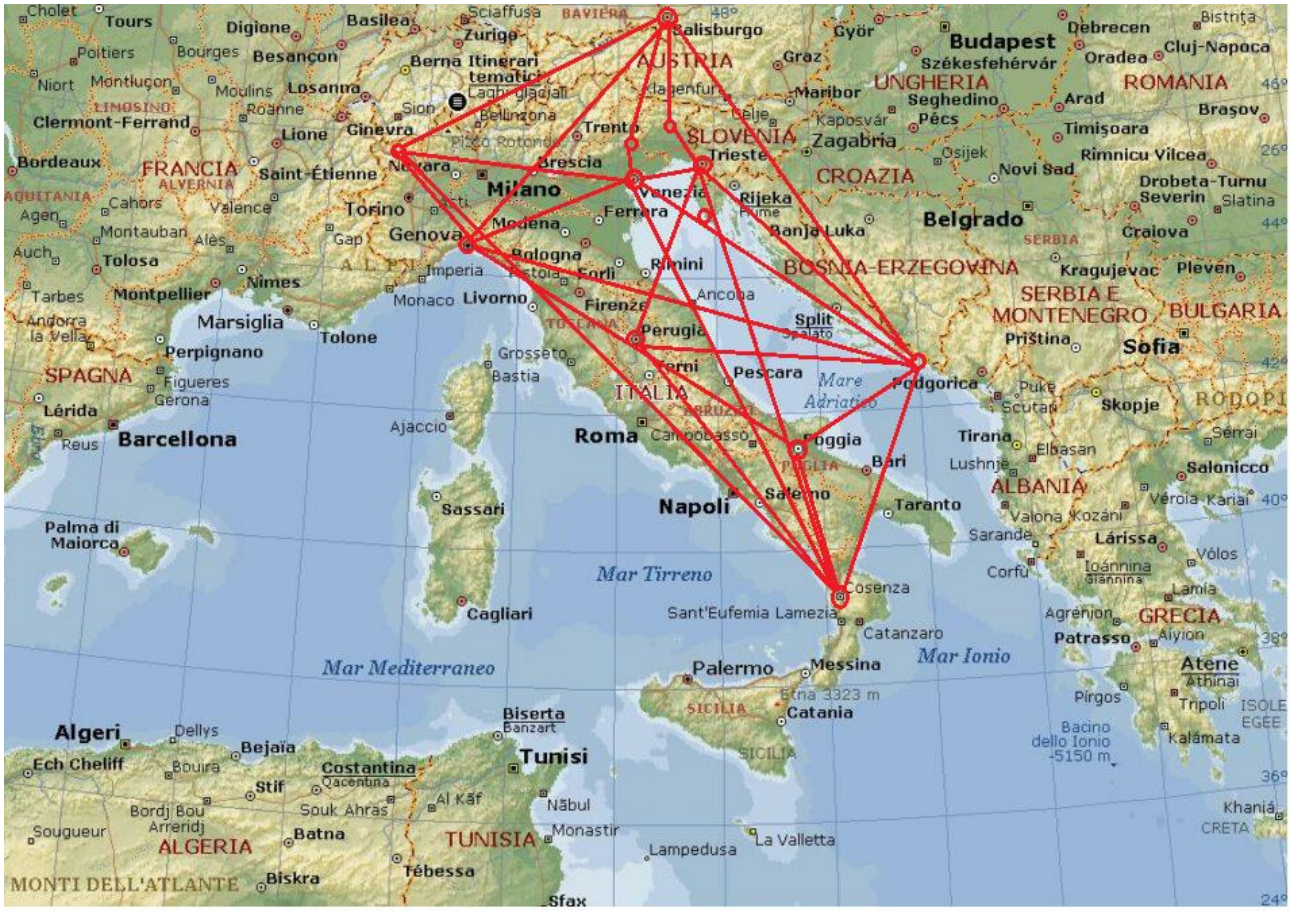
« Se si considera che le prime scosse si fecero sentire a Ragusa a ore 8.56 1/2, a Cosenza, a Todi, a Foligno, a Zara alle ore 9, a Perugia alle ore 9 1', a Firenze a ore 9 3' 5/6, mentre nel resto d'Italia si manifestarono ad ora più tarda e nella valle della Salza l'ondulazione apparve a ore 9 22' 1/2, subito si ravvisa che il movimento nacque realmente verso il centro della Penisola. « Alle origini del Tevere da Fi-

le cento braccia a scuotere con moto convulso ambedue i lidi da Foggia a Venezia, da Cosenza a Genova, e le lontane creste delle Alpi. A tanta potenza e vastità di origine non poteva non corrispondere largo, lontanissimo effetto. »

« Prendendo di mira le stazioni di Ragusa e Venezia, e poi quelle di Spoleto e Venezia, egli calcolò la distanza sopra un arco di circolo massimo della terra, ed ebbe per le prime due 299 miglia o 554 chilometri, e per le seconde 209 miglia o 387 chilometri. La prima distanza percorsa in

« Le altre freccie laterali pure azzurre, segnano le linee d'irraggiamento, e queste, confermando il principio generale, rappresentano veramente i fatti parziali. In un colpo d'occhio si vede come la stessa scossa siasi fatta sentire a Cosenza e ad Aosta, e la freccia lassù sopra Udine, segna la scossa che probabilmente per quella direzione andò fino a Salisburgo e si fece sentire a ore 9, 22' ½ tempo di Roma. »

« Infine nell'Adriatico abbiamo fatto un fascio di freccie con a fianco un punto interrogativo, volendo con questo segnale indicare il supposto punto di provenienza della corrente sdoppiatasi verso l'Italia e verso Dalmazia. »



Salisburgo - Ragusa (Dalmazia) – Aosta – Belluno - Udine – Venezia – Trieste - Pola – Genova – Perugia - Foggia – Cosenza

We note therefore that the earthquake in central Italy of March 12, 1873 was felt from the South (Cosenza, Calabria) to the North (Udine, Friuli-Venezia Giulia) of our peninsula, up to Austria (Salzburg)

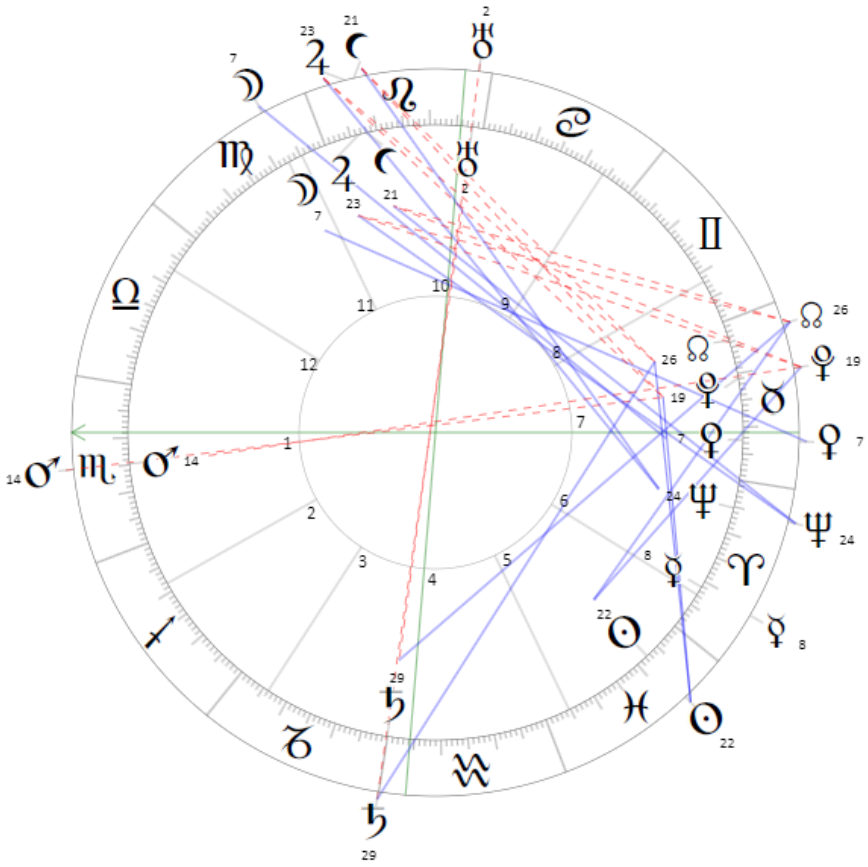
Friday, March 14, 1873 05:44:38 Full Moon 23°44'34 403114.74 km

March 19, 1873 earthquake 7.3 R S. Salvador

March 14, 1873 05:44:38 Full Moon 23°44'34 403114.74 km

March 21, 1873 22:19:38 Last quarter 01°22'57 375835.01 km

Transit sky of Wednesday **12 March 1873** at 21:04:00, Rome, Italy



Nodo lunare – Plutone – Venere – Nettuno – Sole – Mercurio – Saturno – Luna – Giove – Luna – Urano – Marte

Giove-Nettuno; Nettuno-Luna; Saturno-Urano; Luna-Giove-Venere-Nettuno

02/02/1878	9.29	Eclisse anulare.	Meridionale	7.22	17.26

27 January 1880 10:12:16 Full Moon 06°54'44 392030.34 km

Regarding the earthquake of 01.26.1878, we have that:

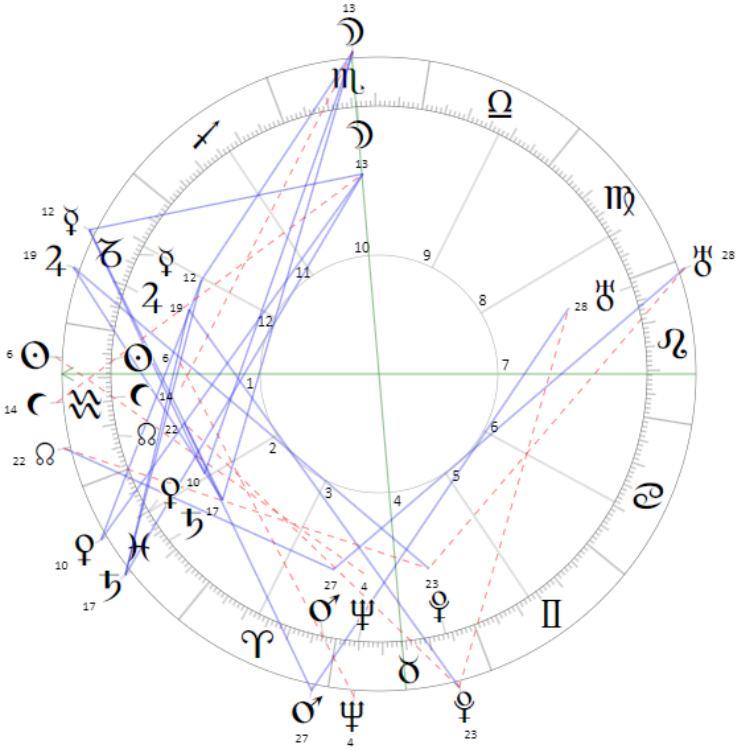
Nel giorno 26 gennaio 1878, alle ore 6, 25 ant. fu avvertito a Lisbona un terremoto preceduto da rombo sotterraneo. La scossa ebbe due impulsi successivi con oscillazioni da E ad O. Durò circa tre secondi. Non furono osservati spostamenti di mobili, ma la maggior parte degli abitanti avvertirono uno scricchiolio nelle impalcature. Ciò av-

Lunedì 28 gennaio 1878, leggere scosse furono avvertite a Rouen, Havre, Caen e lungo tutto il littorale della Manica. Il fenomeno fu sentito anche a Tarbes negli Alti Pirenei, e a Thionville nell'Alsazia.

A Caen il terremoto fu debolmente sentito verso le 11, 45′ a. m. nella direzione di E-O, sola direzione che potè disturbare un orologio a pendolo ed arrestarne il moto. Niun danno ne è avvenuto: tremarono i vetri e i quadri sospesi, ed un provino posato verticalmente cadde rovesciato. È la terza volta che questo fenomeno si fa sentire da 25 anni. Il primo avvenne violentissimo verso il 1859, e il secondo dodici anni fa.

Ho letto quest'oggi col più vivo interesse le notizie che Ella ha pubblicato sui terremoti del 26 e 28 Gennaio, che han scosso il Portogallo, la Francia e l'Inghilterra. Son lieto di farle conoscere, che anche in Italia abbiamo avuto nello stesso periodo un massimo straordinario nelle nostre osservazioni microsismiche; il quale massimo, secondo la legge divenuta già quasi costante, precede i veri sensibili terremoti. Difatti il 25 e il 26 la grande burrasca atmosferica è stata accompagnata qui in Italia da piccole scosse; e queste appunto hanno preceduto il terremoto, che si è manifestato due giorni dopo nella Manica; mentre l'Italia era allora tornata nella più completa tranquillità.

Transit sky of Saturday 26 January 1878 at 06:25:00, Rome, Italy



Luna – Venere; Luna – Giove ; Mercurio – Marte;

09.01.1878 Earth-Sun-Jupiter Conjunction

January 25, 1878 15:49:41 Last quarter 05°36'35 376140.57 km

February 2, 1878 08:17:15 New Moon 13°24'54 403046.19 km

Regarding the eclipses of 1880, we have:

11/01/1880	23.36	Eclisse totale.	Settentrionale	7.37	16.59
07/07/1880	14.10	Eclisse anulare.	Meridionale	4.42	19.47
02/12/1880	4.13	Eclisse parziale. Magnitud. = 0,03	Meridionale	7.20	16.40
31/12/1880	14.42	Eclisse parziale. Magnitud. = 0,71	Settentrionale	7.38	16.49

1880-07-04 08:20 Vallese, Embd

07/07/1880	14.10	Eclisse anulare.	Meridionale	4.42	19.47

7 July 1880 13:21:29 New Moon 15°43'26 404175.72 km

1880-12-01 10 Mistretta Mw = 4.16

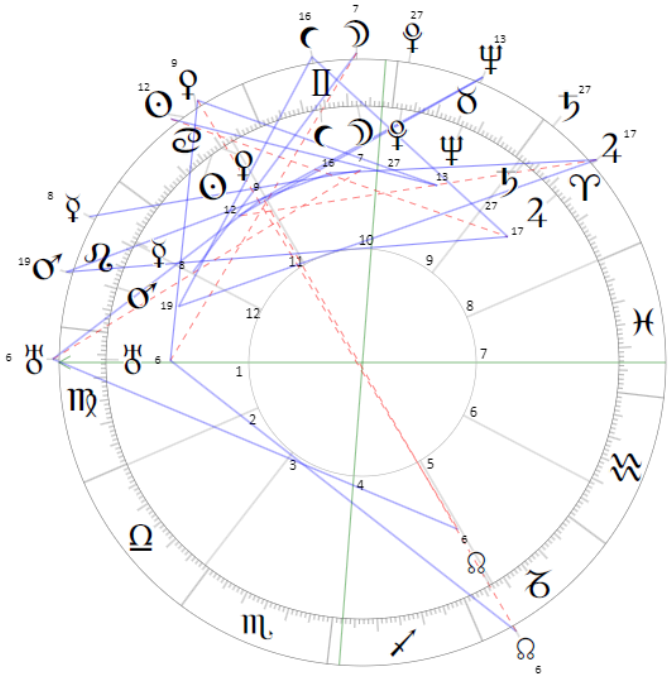
02/12/1880	4.13	Eclisse parziale. Magnitud. = 0,03	Meridionale	7.20	16.40

2 December 1880 02:56:37 New Moon 10°21'56 359428.83 km

(Perigee)

We also have that:

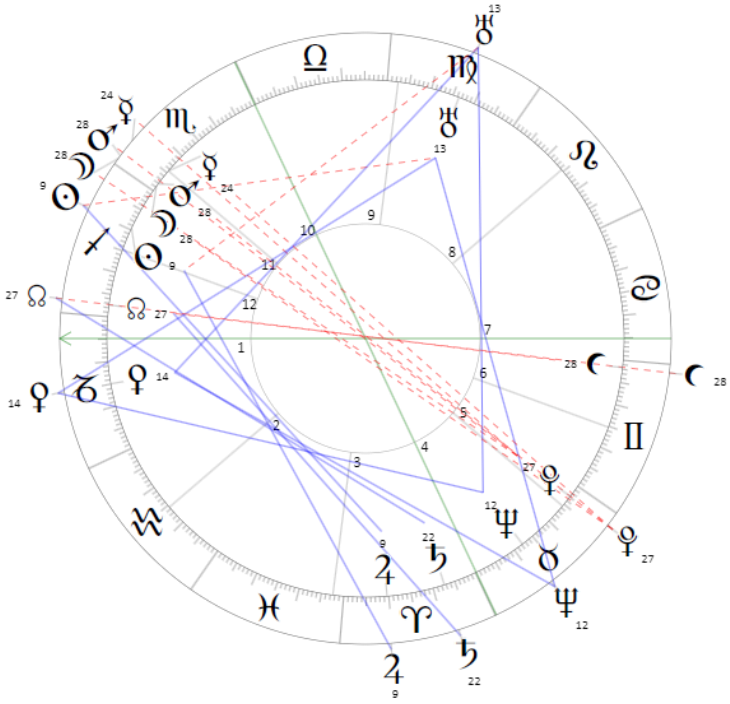
Transit sky of **Sunday 4 July 1880** at 08:20:00, Rome, Italy



Urano-Nettuno; Marte-Nettuno; Urano-Luna; Mercurio-Giove; Nettuno-Luna

Urano-Nettuno-Luna

Transit sky of **Wednesday 1 December 1880** at 08:20:00, Rome, Italy



Luna-Marte-Mercurio -- Plutone

Urano-Nettuno; Urano-Venere; Sole – Giove ; Sole-Saturno;

Sole-Giove-Saturno

28/05/1881	0.51	Eclisse parziale. Magnitud. = 0,73	Settentrionale	4.39	19.35

21/11/1881	17.27	Eclisse anulare.	Meridionale	7.07	16.45

1881-01-24	16:14	Bolognese

30 January 1881 00:48:23 New Moon 10°19'44 359023.06 km

1881-02-12 02:30 Etna - Codavolpe (S. Venerina)

14 February 1881 06:23:54 Full Moon 25°45'08 400516.98 km

1881-03-04 12:05 Casamicciola

28 February 1881 11:32:36 New Moon 10°03'30 365797.97 km

1881-04-23 04:12 Paola

28 April 1881 10:24:45 New Moon 08°14'36 386678.20 km

1881-06-09 Basso Vallese

12 June 1881 06:56:47 Full Moon 21°23'25 362063.98 km

1881-07-22	02:45	Belledonne-Pelvoux

26 Jul 1881 05:19:21 New Moon 03°18'15 406581.25 km

1881-08-03	14:42	Alessandrino
1881-08-05		Belledonne-Pelvoux

9 August 1881 21:07:07 Full Moon 17°20'25 357400.90 km

1881-09-10	07	Chietino

8 September 1881 04:39:47 Full Moon 15°38'25 361473.12 km

1881-09-21	21:20	Tarentaise (Moutiers)
1881-09-28		Cesena
1881-11-05	08:42	Carinthia, Gmuend
1881-11-14	02:55	Montreux
1881-11-25	17:25	Vaud, Aigle
1881-12-04	04:27	Sion
1881-12-17	05:14	Bex

1881-12-28 02 St. Moritz

September 23, 1881	11:54:48	New Moon	00°34'30	397300.47 km
November 6, 1881	02:03:17	Full Moon	13°49'52	380012.05 km
November 13, 1881	23:01:27	Last quarter	21°45'01	404240.24 km
November 21, 1881	16:21:36	New Moon	29°32'50	375651.69 km
December 5, 1881	17:13:56	Full Moon	13°46'23	391336.87 km
January 4, 1882	10:58:48	Full Moon	14°03'17	400790.06 km

The Moon is the closest celestial body to the Earth. Its average distance is 384,400 km. During a lunation, the Earth-Moon distance varies by about 45 thousand km. Furthermore, the maximum (apogee) and minimum (perigee) distances do not remain constant but vary according to non-simple rules. There are many gravitational perturbations that influence the motion of our satellite, consequently it is difficult to predict the real measurements of the apogee and perigee. When the major axis of the lunar orbit is perpendicular to the Earth-Moon line, the difference between the perigee and the apogee is reduced. The minimum Earth-Moon distance will be reached on January 1, 2257 and the minimum on January 7, 2266.

Below are the main data relating to the Earth-Moon distances.

Average apogee 405503 Km

maximum 406720 Km

Average perigee 363296 Km

minimum 356371 Km

Even if it doesn't seem like it, the Earth and the Moon are a binary system, that is, they rotate around each other. The center of gravity of this system is 17 Km below the Earth's surfaces.

Microseismic observations – 1885 earthquakes

OSS. MICROSISM. 1885 Gennajo Decade I.	1	2	3	4	5	6	7	8	9	10	Media	N.d'Os.	Media mensile	N. d'Oss.
Spinea di Mestre	2.37	1.55	1.65	0.72	0.31	1.24	1.13	2.06	1.03	0.00	1.20	40		
Venezia	—	—	—	—	—	—	—	—	—	—	—	—		
Verona	0.09	0.74	0.53	0.97	0.80	0.97	1.06	1.33	0.59	0.97	0.80	46		
Piacenza	0.61	2.05	1.28	0.46	0.77	1.08	0.81	1.34	0.66	0.77	0.98	30		
Moncalieri	1.31	1.36	1.02	1.81	1.86	1.83	1.53	2.11	1.10	0.84	1.17	118		
Alessandria	0.68	2.00	1.32	0.53	0.65	1.08	0.86	1.15	0.55	0.43	0.92	48		
Parma	0.86	1.13	1.05	0.66	0.58	0.58	0.74	2.60	0.69	0.41	0.93	50		
Bologna-S. Luca	1.77	1.35	2.36	0.58	0.67	0.67	0.89	1.09	1.08	0.84	1.08	40		
Chiavari	0.17	2.60	4.44	0.37	0.00	0.49	0.14	1.76	0.37	0.09	0.74	78		
S. Gio: in Galilea	1.40	1.10	2.71	1.92	0.87	1.61	1.53	1.58	1.07	0.33	1.41	71		
Pesaro	6.05	6.47	9.57	2.67	1.68	6.83	5.77	4.62	8.80	0.42	5.18	60		
Firenze t. a.	0.93	2.89	4.19	1.83	1.63	2.43	1.00	3.80	0.73	0.47	1.99	66		
Firenze t. n.	0.81	0.77	1.27	0.71	0.47	0.67	0.55	2.06	0.32	0.50	0 81	66		
Livorno	—	—	—	—	—	—	—	—	—	—	—	—		
Fermo	2.21	2.30	5.68	3.46	6.47	7.63	4.17	2.13	4.37	0.00	3.84	20		
Perugia	1.78	1.78	2.97	2.07	1.18	2.37	2.52	1.48	1.18	0.59	1.79	40		
M. Fortino	4.29	2.87	0.00	2.87	5.74	1.92	1.43	0.00	0.00	1.92	2.10	23		
Spoleto	—	—	—	—	—	—	—	—	—	—	—	—		
Narni	1.69	2.3	1 24	1.69	4.14	1.29	3.63	0.64	0.64	1.49	1.87	32		
Viterbo	0.00	0.53	1.41	1.32	1.58	1.41	0.70	0.53	0.70	0.00	0.81	25		
Aquila	1.11	1.41	1.93	2 43	2.36	4.14	2.48	1.61	1.48	0.41	1.93	50		
Roma	0.58	0.86	1.35	1.20	0.99	1.02	0.93	0.54	0.75	0.22	0.84	72		
Rocca di Papa	2.94	5.79	3.61	4.39	3.17	3.50	4.54	2.18	2.52	1.26	3.39	65		
Velletri	0.84	1.80	2.28	1.41	1.56	1.56	1.44	1.08	1.08	0.48	1.35	331		
Ceccano	0.00	2.93	0.00	0.00	0.87	1.05	0.00	0.00	0.00	0.00	0.48	28		
Foggia	0.77	1.71	1.07	2.27	2.23	2.10	1.71	3.34	1.71	0.34	1.73	40		
Pozzuoli	1.37	3.19	1.67	0.76	0 60	2.12	0.76	0.76	0.60	0.45	1.22	40		
Lecce	—	—	—	—	—	—	—	—	—	—	—	—		
Corleone	1.45	2.41	2.66	1.69	2.90	1.93	2.42	1.69	2.17	2.17	2.14	30		
Acireale	—	—	—	—	—	—	—	—	—	—	—	—		
Catania	0.96	4.23	6.22	5.07	1.94	7.93	1.58	1.02	1.03	1.03	3.09	57		
Med. microsism.	1.42	2.23	2.32	1.68	1.77	2.26	1.70	1.63	1.33	0.61	1.69.	1566		
Numero di scosse	4	3	3	3	4	3	3	2	3	4	Tot. delle sc. 32			
Intens. massima.	5°	4°	3°	1°	4°	1°	2°	3°	1°	1°				

Decade I.ª Incominciando dunque dalla 1.ª decade del Gennaio 1885 non si può non ricordare che in quel periodo ferveva l'attività endogena nell'Andalusia. Di quel periodo ho avuto già più volte occasione di ragionare specialmente nell'Annuario Meteorologico della Società Met. Ital. (Anno I, pag. 168) e vi ho mostrato la connessione continuata delle burrasche sismiche d'ambedue le regioni, tanto che ho chiamato quel periodo Italo-iberico. I moti microsismici furono piuttosto notevoli sempre ed accompagnarono con costante precedenza i massimi sismici che avvennero nei giorni 1, 5 ed 8. La pressione barometrica sempre alta non parve perturbare l'andamento geodinamico.

January 5, 1885 (seismic maximum)

1885-01-05 06 Queyras (Guillestre - Piemonte) M = 4 - 4.19

1 January 1885 05:26:14 Full Moon 11°02'05 357385.29 km

(Perigee)

OSS. MICROSISM. 1885 Gennajo Decade III.	21	22	23	24	25	26	27	28	29	30	31	Media	N.d'Os.	Media mensile	N. d'Oss.
Spinea di Mestre	1. 54	2. 17	1. 34	2. 37	1. 86	0. 41	1. 44	0. 00	0. 00	0. 00	0. 93	1. 09	44		
Venezia	4. 88	4. 11	4. 54	7. 75	2. 51	3. 36	5. 06	1. 28	0. 60	1. 80	2. 97	3. 50	55		
Verona	0. 48	0. 38	0. 19	2. 62	0. 32	1. 76	0. 09	0. 34	0. 09	0. 06	0. 48	0. 61	43		
Piacenza	1. 50	0. 92	1. 03	1. 04	1. 39	0. 97	0. 77	0. 61	0. 66	1. 23	1. 70	1. 07	33		
Moncalieri	1. 18	2. 34	1. 35	1. 24	2. 24	1. 85	1. 42	1. 85	1. 59	1. 67	1. 25	1. 68	132		
Alessandria	0. 24	0. 38	0. 26	0. 45	1. 27	1. 44	0. 31	0. 48	0. 55	1. 49	2. 55	0. 85	55		
Parma	1. 92	0. 70	1. 03	0. 59	2. 11	1. 40	1. 37	0. 82	1. 02	0. 82	2. 16	1. 26	53		
Bologna - S. Luca	2. 02	2. 19	0. 00	2. 95	1. 89	0. 67	1. 01	0. 78	1. 77	0. 56	0. 50	1. 30	41		
Chiavari	0. 27	0. 14	0. 00	0. 39	1. 31	1. 04	0. 00	0. 14	0. 02	0. 76	2. 76	0. 62	61		
S. Gio: in Galilea	1. 51	2. 64	2. 30	2 32	0. 80	1. 53	1. 75	0. 62	0. 25	0. 21	0. 45	1. 30	65		
Pesaro	2. 89	10.41	7. 46	11.40	1. 40	2. 95	6. 75	0. 98	0. 00	0. 00	0. 42	4. 01	06		
Firenze t. a	0. 67	2. 30	1. 76	2. 21	2. 72	1. 96	1. 76	2. 39	1. 14	1. 96	4. 13	2. 09	74		
Firenze t. n	0. 81	0. 51	1. 22	1. 22	1. 22	1. 11	1. 42	1. 01	0. 41	1. 62	2. 64	1. 19	74		
Livorno	—	—	—	—	—	—	—	—	—	—	—	—	—		
Fermo	3. 56	3. 85	3. 46	4. 41	0. 00	2. 11	0. 75	0. 00	0. 00	0. 00	0. 00	1. 64	22		
Perugia	1. 78	2. 97	2. 37	2. 37	1. 04	2. 08	1. 93	1. 04	0. 59	0. 59	0. 74	1. 59	44		
M. Fortino	5. 44	3. 84	0. 00	4. 29	0. 00	0. 00	0. 00	0. 00	0. 95	0. 00	2. 14	1. 46	27		
Spoleto	—	—	—	—	—	—	—	—	—	—	—	—	—		
Narni	3. 18	1. 88	3. 58	1. 48	2. 93	0. 74	3. 38	1. 88	0. 59	2. 18	1. 29	2. 10	33		
Viterbo	1. 05	1. 05	0. 17	0. 88	0. 17	1. 32	1. 23	0. 53	0. 00	0. 00	1. 23	0. 69	31		
Aquila	2. 49	4. 47	2. 90	3. 32	1. 07	1. 54	1. 43	1. 15	0. 45	0. 11	0. 45	1. 76	55		
Roma	1. 38	0. 64	0. 91	1. 74	1. 18	1. 82	1. 25	1. 08	0. 28	0. 38	1. 29	1. 07	96		
Rocca di Papa	3. 51	1. 78	1. 68	4. 46	3. 36	2. 38	3. 17	3. 10	1. 08	0. 84	2. 88	3. 02	89		
Velletri	1. 83	0. 90	1. 30	2. 72	2. 07	2. 00	1. 56	1. 25	0. 37	0. 14	1. 33	1. 40	364		
Ceccano	0. 00	0. 21	0. 00	—	0. 29	0. 00	0. 00	0. 00	0. 00	0. 00	—	0. 05	34		
Foggia	2. 78	1. 67	3. 46	1. 97	1. 16	1. 88	2. 66	0. 86	1. 12	0. 34	0. 04	1. 63	44		
Pozzuoli	1. 21	0. 91	0. 91	1. 06	0. 60	3. 34	2. 43	0. 60	0. 60	0. 00	0. 00	1. 06	44		
Lecce	—	—	—	—	—	—	—	—	—	—	—	—	—		
Corleone	1. 45	1. 93	2. 90	3. 38	2. 65	1. 45	1. 93	1. 45	1. 93	0. 72	0. 72	1. 86	83		
Acireale	—	—	—	—	—	—	—	—	—	—	—	—	—		
Catania	0. 90	2. 79	1. 07	0. 7	5. 61	3. 37	2. 25	1. 16	1. 06	0. 60	0. 41	2. 27	76		
Med. microsism.	2. 03	2. 13	1. 74	2. 66	1. 59	1. 83	1. 74	0. 94	0. 64	0. 66	1. 35	1. 56	1790		
Numero di scosse	10	4	4	14	19	16	9	6	1	2	6	Totale sc. 100			
Intens. massima.	1°	3°	1°	6°	1°	1°	1°	1°	1°	2°	3°				

done i massimi nel 12, 14, 17, 19 e 20 tutte date quasi decadicamente corrispondenti ai massimi della 1.ª decade.

Decade III. I centri di depressione barometrica si fanno sentire sull'Italia nei giorni 21, 23 e 26 coincidendo coll'agitazione microsismica assai notevole. La quale alla sua volta pure accompagnava e precedeva in massimi sismici ossia i terremoti che non forti ma vieppiù numerosi in questa decade ascesero alla totale cifra del centinaio. I loro maggiori gruppi apparvero ai 21-22, ai 24-28, 31 nuovamente, cioè con distanze approssimativamente decadiche dai precedenti.

M. S. DE ROSSI.

22-23-24 January 1885 (seismic maximum)

1885-01-24 20 Liguria occidentale Mw = 4.40

January 24, 1885	01:26:09	First quarter	04°17'28	375892.94 km
January 30, 1885	16:19:10	Full Moon (Perigee)	11°00'50	362859.31 km

OSS. MICROSISM. 1885 Febbrajo Decade III.	21	22	23	24	25	26	27	28	Media	N. d'Os.	Media mensile	N. d'Oss.
Spinea di Mestre	0. 41	1. 33	0. 71	0. 71	0. 61	0. 00	0. 51	0. 00	0. 53	32		
Venezia	1. 44	4. 59	0. 90	0. 64	0. 64	0. 96	0. 74	0. 74	1. 33	40		
Verona	0. 19	0. 97	0. 43	0. 40	0. 48	0. 48	0. 34	3. 03	0. 79	45		
Piacenza	0. 97	1. 03	1. 08	0. 92	1. 59	0. 92	1. 19	1. 28	1. 12	24		
Moncalieri	1. 53	1. 71	0. 94	1. 79	1. 39	2. 41	1. 48	1. 55	1. 60	96		
Alessandria	0. 93	0. 72	0. 43	0. 36	1. 15	0. 77	0. 45	0. 65	0. 68	40		
Parma	0. 81	0. 86	0. 53	0. 37	0. 29	0. 29	0. 33	0. 41	0. 48	41		
Bologna-S. Luca	0. 33	1. 01	0. 92	0. 50	1. 26	0. 67	0. 00	0. 22	0. 61	29		
Chiavari	0. 59	0. 37	0. 62	0. 04	0. 04	2. 76	0. 00	0. 19	0. 57	46		
S. Gio: in Galilea	0. 77	0. 60	0. 47	0. 53	0. 57	0. 75	0. 28	0. 23	0. 42	51		
Pesaro	0. 56	1. 12	0. 42	0. 28	0. 42	0. 42	0. 14	0. 00	0. 42	48		
Firenze t. a.	1. 43	1. 19	0. 54	0. 35	0. 89	4. 66	0. 07	0. 27	1. 17	64		
Firenze t. n.	1. 13	1. 28	0. 61	0. 65	0. 96	8. 25	0. 30	0. 61	1. 09	64		
Livorno	—	—	—	—	—	—	—	—	—	—		
Fermo	0. 00	0. 00	0. 00	0. 00	0. 00	0. 00	0. 00	0. 38	0. 04	16		
Perugia	0. 59	1. 33	0. 89	1. 64	0. 89	1. 04	0. 59	0. 59	0. 87	32		
M. Fortino	5. 01	0. 95	2. 87	0. 00	2. 52	0. 00	0. 00	2. 14	1. 69	20		
Spoleto	—	—	—	—	—	—	—	—	—	—		
Narni	0. 64	0. 99	3. 18	0. 69	1. 83	1. 14	2. 33	1. 14	1. 32	24		
Viterbo	0. 39	0. 53	0. 17	0. 00	0. 00	0. 66	0. 00	0. 00	0. 21	29		
Aquila	1. 09	1. 43	0. 59	1. 36	1. 57	0. 41	0. 61	0. 48	0. 94	40		
Roma	0. 66	0. 89	0. 37	0. 35	0. 44	1. 16	0. 43	0. 28	0. 54	44		
Rocca di Papa	2. 28	1. 96	1. 51	1. 99	1. 68	1. 32	1. 44	1. 47	1. 70	50		
Velletri	0. 55	0. 76	0. 93	0. 59	0. 36	0. 43	0. 33	0. 37	0. 54	266		
Ceccano	—	0. 00	0. 00	0. 29	0. 00	0. 00	0. 00	0. 29	0. 82	19		
Foggia	0. 86	1. 12	1. 25	1. 50	1. 12	1. 16	0. 34	0. 17	0. 94	32		
Pozzuoli	0. 30	0. 60	0. 76	1. 06	0. 60	0. 60	1. 21	5. 47	1. 32	32		
Lecce	—	—	—	—	—	—	—	—	—	—		
Corleone	1. 45	0. 96	0. 72	1. 45	1. 93	1. 45	1. 93	0. 96	1. 35	23		
Acireale	—	—	—	—	—	—	—	—	—	—		
Catania	0. 69	1. 13	0. 92	0. 78	0. 88	0. 68	0. 99	0. 99	0. 87	41		
Med. microsism.	0. 98	1. 08	0. 84	0. 69	0. 89	1. 05	0. 59	0. 88	0. 88	1288		
Numero di scosse	6	2	1	2	2	4		10	Tot. delle sc.	31		
Intens. massima	3°	2°	2°	2°	1°	6°	3°	3°				

rona. Così i due massimi sismici di questa decade conservaronsi alla medesima distanza periodica dei precedenti corrispondendo quello del 21 all'anteriore del 10, e quello del 26 all'altro del 16.

M. S. DE ROSSI

February 21-26, 1885 (seismic maximum)

1885-02-26	20:48	Pianura Padana	Mw = 5.01

February 21, 1885 Jupiter opposition

March 1, 1885 04:00:14 Full Moon 10°46'29 372102.89 km

OSS. MICROSISM. 1885 Decembre Decade III.	21	22	23	24	25	26	27	28	29	30	31	Media	N.d'Os.	Media mensile	N. d'Os.
Spinea di Mestre	0. 00	0. 20	0. 00	2. 06	1. 14	0. 56	1. 85	0. 30	0. 10	2. 79	2. 29	1. 02	44		
Venezia	0. 26	0. 00	0. 21	1. 06	0. 53	1. 06	0. 53	0. 53	0. 53	2. 40	0. 26	0. 67	66		
Verona	—	—	—	—	—	—	—	—	—	—	—	—	—		
Piacenza	1. 34	1. 28	0. 81	0. 61	1. 12	0. 72	0. 88	1. 62	1. 59	0. 97	0. 81	1. 05	82		
Moncalieri	0. 54	1. 47	1. 41	2. 31	1. 67	1. 77	2. 62	2. 15	2. 01	2. 68	1. 98	1. 87	125		
Alessandria	0. 46	1. 10	0. 70	1. 44	0. 78	0. 62	1. 85	0. 70	0. 76	1 34	1. 23	0. 94	61		
Parma	0. 45	2. 16	0. 66	3 21	3. 06	0. 62	2. 36	0. 58	2. 12	3. 63	2. 92	1. 98	55		
Bologna - S. Luca	0. 00	0 99	0. 16	1. 01	1. 53	0. 84	1. 51	0. 94	0. 00	2. 03	0. 78	0. 89	46		
Chiavari	—	—	—	—	—	—	—	—	—	—	—	—	—		
S. Gio: in Galilea	0. 06	0. 12	0. 12	0. 62	1. 14	0. 42	0. 55	0. 23	0. 08	1. 48	1. 02	0. 53	66		
Pesaro	0. 30	0. 15	0. 00	1. 07	1. 99	0. 76	2. 60	1. 07	0. 00	3. 67	3. 37	1. 36	66		
Firenze t. n	3. 45	3. 34	3. 34	3. 45	3. 34	0. 89	2. 63	0. 20	1. 26	4. 40	3. 50	2. 66	74		
Firenze t. a	1. 03	3. 14	3. 14	1. 03	3. 14	1. 52	0. 81	0. 51	1. 68	2. 90	2. 70	1. 96	74		
Livorno	—	—	—	—	—	—	—	—	—	—	—	—	—		
Fermo	0. 00	0. 00	0. 00	0. 00	6. 65	0. 96	0. 00	0. 00	0. 00	0. 00	4. 95	1. 14	21		
Perugia	0. 59	0. 89	0. 59	0. 59	1. 63	0. 59	1. 48	0. 89	0. 74	2. 67	5. 20	1. 44	44		
M. Fortino	—	0. 00	0. 00	0. 00	1. 43	0. 52	0. 95	0. 47	0. 00	2. 87	1. 91	0. 81	26		
Spoleto	0. 00	0. 00	0. 00	0. 00	2. 42	1. 81	0. 00	2. 42	0. 00	1. 81	2. 42	0. 98	19		
Narni	0 49	0. 34	0. 00	0. 00	0. 99	0. 99	1. 49	1. 49	0. 00	0. 49	1. 74	0. 73	33		
Viterbo	0. 00	1. 05	0. 00	1. 32	1. 05	0. 35	1. 10	0. 53	0 35	0 53	1. 85	0. 74	31		
Aquila	0. 19	0. 46	0. 54	0. 56	4. 04	0. 73	1. 96	1. 57	0. 80	3. 02	3. 00	1. 53	53		
Roma	0. 53	1. 71	0. 88	2. 52	3. 09	0. 93	2. 71	1. 53	1. 26	2. 75	4. 23	2. 01	106		
Rocca di Papa	0. 00	0. 84	0. 84	1. 30	3. 17	0. 84	0. 98	1. 78	0. 92	1. 91	3. 49	1. 46	107		
Velletri	0. 17	1. 22	0. 70	1. 45	2. 38	1. 01	2. 04	1. 15	1. 65	2. 73	3. 83	1. 67	366		
Ceccano	—	—	—	—	—	—	—	—	—	—	—	—	—		
Foggia	0. 21	0. 56	0. 00	0. 00	1. 25	1. 29	1. 71	2. 49	0. 90	1. 58	3. 46	1. 22	44		
Benevento	0. 11	0. 13	0. 22	0. 22	0. 89	0. 56	1. 17	0. 61	0. 55	1. 08	1. 67	0. 65	33		
Pozzuoli	0. 60	0. 60	1. 21	0. 60	6. 08	3. 65	5. 48	6. 69	3. 65	7. 61	7. 30	3. 95	44		
Lecce	0. 40	0. 00	0. 00	0. 00	0. 35	2. 61	3. 22	1. 91	2. 82	2. 51	3. 62	1. 58	33		
Corleone	1. 93	1. 45	1. 69	1. 45	1. 69	1. 21	0. 72	1. 45	1. 93	1. 69	2. 66	1. 62	33		
Acireale	0. 86	0. 15	0. 10	0. 08	1. 32	0. 54	0. 36	1. 02	0. 71	0. 56	1. 08	0. 57	44		
Catania	0. 56	0. 82	0. 32	0. 36	5. 71	1. 52	1. 27	1. 49	1. 28	1. 20	6. 29	1. 89	74		
Med. microsism.	0. 52	0. 86	0. 63	1. 01	2. 26	1. 04	1. 58	1. 29	0. 98	2. 26	2. 84	1. 39	1820		
Numero di scosse	1	1	2	7	3	6	3	2	4	6	10	Totale sc.	45		
Intens. massima.	1	1	1	6	2	9	1	1	7	1	3				

Decade III.ª L'attività microsismica in questa decade tende ad un relativo riposo, manifestando minori i suoi massimi sempre però nella 2ª metà del periodo e col favore barometrico nei soli giorni di maggiore movimento cioè nel 25, 30 e 31. I terremoti furono molti di numero e di forza continuatamente dal 24 al 31 specialmente nel 24, 26, 29, 31. Fu la Basilicata nel 24 e 26 che sopportò gli urti maggiori; la Toscana nel 25; il Veneto nel 29; l'Umbria, il Lazio, e Benevento nel 30 e 31.

24-25 30-31 December (seismic maximum)

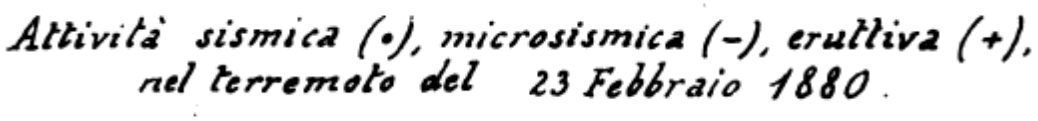
1885-12-24	10:50	Basilicata
1885-12-25	22:45	
1885-12-26	02	Molise
1885-12-26	03	La Gretagna (Basilicata)
1885-12-29		Alpago Cansiglio (Veneto)

December 21, 1885 20:58:34 Full Moon 00°14'03 360297.18 km

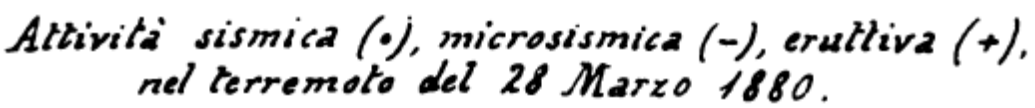
(Perigee)

January 5, 1886 07:43:45 New Moon 14°57'35 404999.84 km

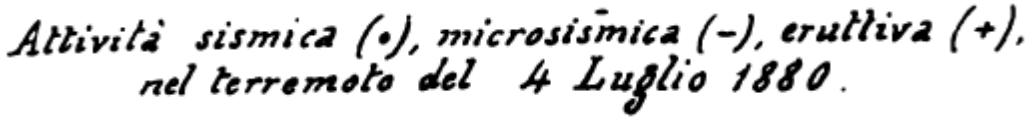
Some seismic events in the years 1880-1881

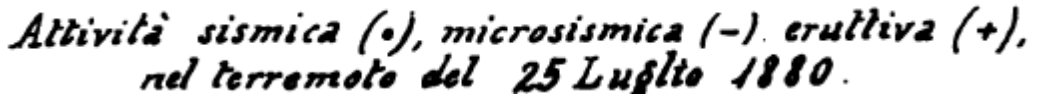


26 February 1880 01:21:57 Full Moon 06°52'03 380821.68 km



March 26, 1880 13:23:38 Full Moon 06°16'43 370160.23 km

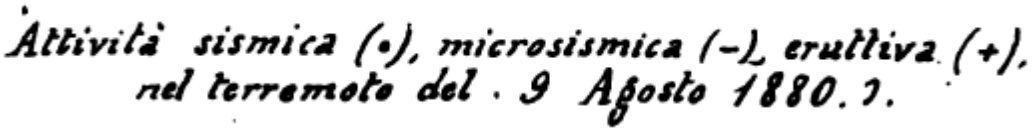




07/07/1880	14.10	Eclisse anulare.	Meridionale	4.42	19.47

July 7, 1880 13:21:29 New Moon 15°43'26 404175.72 km

July 21, 1880 21:02:26 Full Moon 29°23'06 361641.58 km



6 August 1880 03:48:30 New Moon 14°00'11 397385.59 km

Decade III.	21	22	23	24	25	26	27	28	29	30		Media	N.d'Os.
Bologna	1.37	2.12	2.30	0.48	0.69	1.88	1.87	1.36	1.06	0.69		1.33	66
Rimini	0.00	0.42	0.00	o. oo	0.00	1.13	2.12	3.25	1.13	0.00		0.80	20
Firenze t. a	2.33	2.98	1.87	0.34	0.53	0.81	1.46	1.36	0.22	0.30		1.22	110
Firenze t. n	1.41	2.68	1.56	0.59	0.54	1.52	3.30	1.48	0.70	0.54		1.41	110
Livorno	3.85	6.50	6.74	1.92	0.72	4.33	3.85	0.96	1.44	0.48		3.07	19
Fermo	0.34	0.49	0.94	0 31	0.25	0.30	3.03	3.08	1.63	1.15		1.15	31
M. Fortino	0.00	0.61	0.48	0.00	0.48	0.71	0.92	1.43	0.42	0.00		0.50	26
Narni	4 82	4.08	1.26	0.05	0.00	0.25	0.56	0.00	0.74	0.54		1.23	36
Viterbo	0.53	0.66	0.35	1.05	1.05	1.05	1.98	0.52	0.66	0.52		0.83	34
Roma	0.85	1.43	1.46	0.88	0.45	0.80	1.82	2.46	1.55	0.98		1.26	94
Rocca di Papa	0.00	1.68	0.00	0.00	3.37	—	0.00	--	0.00	0.00		0.63	20
Velletri	1.38	2.12	1.76	1.05	0.43	1.19	2.27	1.74	3.01	2.20		1.72	294
Ceccano	0.00	0.00	0.00	0.00	0.00	0.00	1.46	5.27	0.00	0.00		0.67	35
Foggia	1.71	2.14	2.40	0.81	0.21	0.77	0.47	2.06	2.44	2.74		1.57	40
Corleone	1.63	0.90	2.35	1.63	1.44	1.44	1.69	0.72	0.48	1.44		1.37	38
Med. gen. diurna	1.34	1.92	1.56	0.60	0.67	1.15	1.78	1.83	1.03	0.77		1.26	973
1881 MAGGIO Decade I.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			
Bologna	1.24	0 85	1.30	1.18	2.07	1.59	0.91	0.43	1.77	1.99		1.33	69
Rimini	0.00	0.00	0.00	0.00	o. oo	o. oo	o. oo	1.98	2 97	1.98		0.69	20
Firenze t. a	0.10	1.32	2.84	0.91	0.22	0.10	0.10	0.22	0.12	0.41		0.63	99
Firenze t n	0.54	1.39	2.11	1.19	0.87	0.65	0.45	0.13	0.80	2.00		1.00	99
Livorno	1.44	4.62	4.33	3.37	1.44	0 72	0.48	0.00	0.48	7.23		2.41	19
Fermo	0.18	0.42	0.87	0.73	0.56	1.00	0.57	0.23	0.21	1.92		0.66	25
M. Fortino	o.oo	0.95	1.52	0.47	1.07	0.00	0.95	0.00	0.00	1.67		0.66	25
Narni	0.54	3.46	1.11	0.29	1.35	1.04	0.22	0.45	0.64	1.12		1.02	33
Viterbo	0.00	0.70	1.05	—	1.26	1.45	0.35	0.74	0.00	0.95		0.72	29
Roma	0.16	0.57	1.58	1.08	0.24	0.28	0.58	0.28	0.22	1.82		0.67	88
Rocca di Papa	3.37	3.22	1.26	0.00	0.00	0.00	3.53	0.42	0.00	0.00		1.18	32
Velletri	0.45	1.05	1.20	1.39	0.58	0.47	0.45	0.32	0.33	2.36		0.86	323
Ceccano	0.00	—	1.09	0.87	0.43	—	0.43	0.00	0.00	0.87		0.46	18
Foggia	0.17	1.25	1.12	1.07	0.47	0.17	1.88	0.81	1.37	2.01		1.03	40
Corleone	1.63	1.08	1.81	0.36	1.27	0.18	1.63	1.81	1 63	1.81		1.32	40
Med. gen. diurna	0.65	1.49	1.54	0.92	1.78	0.54	0.83	0.52	0.70	1.87		1.08	959
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**			
Bologna	0.92	0 75	0.37	0.95	2.00	0.55	0.87	0.69	0.58	0.31		0.79	63
Rimini	o. oo	0.00	0 00	o. oo	1.69	0.56	0.00	0.00	o. oo	o. oo		0.22	20
Firenze t. a	0.30	0 34	0.22	0.06	0.16	0.06	0.49	0.12	0.00	0.12		0.18	98
Firenze t. n	0.83	0.33	0.54	0 54	0.43	0.24	1.74	0.54	0.00	0.17		0 52	98
Livorno	0.72	1.20	0 96	2.41	0.60	0.24	2.65	0.48	0.24	0.24		0.97	20
Fermo	0.89	0.13	0.25	o. 38	0.26	0.03	0.17	0.76	0.07	0.05		0.30	20
M. Fortino	2.95	0.71	0.00	0.95	0.00	5.30	0.00	0.01	0 35	0.71		1.10	24
Narni	0.79	0.39	2.13	2.28	0.52	1.63	1.59	1.24	0.00	0.09		1.06	28
Viterbo	0.26	0.66	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00		0.12	33
Roma	1.20	0.40	0.45	0.50	0 40	0.14	0.31	0.40	0.16	0.40		0.43	77
Rocca di Papa	0.00	3.79	1.68	o. oo	0.00	2.80	0.42	—	—	—		1.24	25
Velletri	1.50	0.35	1.24	1.21	0.78	0.53	0.48	0.79	0.63	0.54		0.80	329
Ceccano	1.31	0.00	0.00	3.51	0.00	0.00	0.00	3.51	0.00	0.00		0.83	21
Foggia	0.17	0.91	0.81	1.07	0.94	0.17	0.29	1.84	3.21	1.12		0.98	40
Corleone	0.72	0.90	1.63	1.16	0.90	0.90	1.81	2.17	1.27	0.72		1.21	40
Med. gen. diurna	0.83	0.67	0.68	1.00	0.57	0.87	0.74	0.89	0.46	0.32		0.71	936
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**		
Bologna	0.37	0.31	1.06	0.69	0.37	0.37	0.75	0.37	0.69	0.87	0.75	0.60	67
Rimini	0.00	0.00	0. oo	0. oo	0. oo	0. oo	0. oo	0.00	0.00	0.00	0.00	0.00	22
Firenze t. a	0.12	0.20	0.12	0.36	0.08	0.04	0.12	0.20	0.18	0.16	0.06	0.14	105
Firenze t. n	0.04	0.20	0.43	0.33	0.22	0.29	0.65	0.61	0.47	0.39	0.17	0.33	105
Livorno	0 12	0.48	0.36	1.08	0.48	0.24	1.80	1.03	0.96	0.79	0.96	0.75	21
Fermo	0.01	0.05	0.57	—	0.07	0.11	0.30	0.19	0.46	0.15	0.19	0.21	14
M. Fortino	1.19	1.43	4.58	0.51	2.86	1.48	0.71	0.95	1.43	0.71	0.00	1.44	27

April 23, 1881 6.74 (Microseismic maximum)

1881-04-23	04:12	Paola

28 April 1881 10:24:45 New Moon 08°14'36 386678.20 km

Narni	0.14	0.29	2.98	0.79	0.39	1.04	1.59	0.09	0.00	2.23	0.54	0.91	29
Viterbo	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	32
Roma	0.50	0.25	0.08	0.37	0.30	0.58	0.65	0.47	0.54	0.47	0.37	0.41	84
Rocca di Papa	0.00	2.80	0.84	0.84	3.03	0.00	0.00	0.00	0.84	0.00	0.00	0.76	30
Velletri	0.59	0.29	0.34	0.51	0.45	0.11	0.89	0.61	0.72	0.42	0.42	0.49	355
Ceccano	0.00	0.58	0.58	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.50	0.16	61
Foggia	0.17	0.86	1.29	0.43	0.00	0.34	0.81	0.51	0.17	0.43	0.90	0.55	44
Corleone	0.72	1.63	1.63	1.27	1.81	1.99	1.08	0.72	1.27	1.08	1.99	1.38	44
Med. gen. diurna	0.28	0.62	0.98	0.51	0.67	0.43	0.62	0.39	0.51	0.51	0.45	0.59	1040
1881 GIUGNO Decade I.	1	2	3	4	5	6	7	8	9	10		Media	N.°Os
Bologna	0.37	0.61	0.37	1.18	0.84	2.19	1.92	2.10	1.73	0.75		1.20	62
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.04	0.02	0.06	0.16	0.04	0.32	2.47	2.84	1.52	0.59		0.79	107
Firenze t. n.	0.02	0.20	0.15	0.89	0.31	1.41	2.54	3.29	1.72	0.89		1.09	107
Livorno	0.24	0.36	0.48	0.00	0.84	2.23	7.95	5.06	2.41	0.96		2.05	19
Fermo	0.00	0.00	0.00	0.19	0.07	1.08	0.77	1.02	0.65	0.53		0.43	18
M. Fortino	3.82	2.39	5.31	4.29	3.82	4.29	3.82	10.77	0.00	0.00		3.85	25
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.70	0.88	2.11	0.88	0.53		0.51	28
Roma	0.38	0.41	0.36	0.45	0.20	0.50	1.67	2.06	1.34	0.87		0.82	88
Rocca di Papa	2.24	0.30	0.42	2.73	1.96	0.42	—	3.08	1.54	1.68		1.56	33
Velletri	0.32	0.28	0.35	0.51	0.34	1.82	2.54	2.57	1.02	0.54		1.03	333
Ceccano	0.00	0.00	0.21	0.00	0.58	1.23	2.05	2.41	3.95	0.00		1.04	48
Foggia	0.94	0.12	0.17	0.12	0.12	0.60	2.10	1.97	2.49	0.81		0.94	40
Corleone	0.36	0.72	1.08	1.81	0.36	1.27	1.27	1.44	1.81	0.54		1.06	40
Med. gen. diurna	0.67	0.39	0.68	0.91	0.72	1.39	2.49	3.13	1.62	0.66		1.26	950
Decade II.	11	12	13	14	15	16	17	18	19	20			
Bologna	0.61	1.06	0.81	0.87	0.75	0.55	0.69	0.55	0.54	0.37		0.68	68
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.45	0.83	0.06	0.18	0.06	0.02	0.00	0.06	0.10	0.26		0.20	88
Firenze t. n.	0.78	1.13	0.47	0.72	0.70	0.35	0.26	0.54	0.26	0.33		0.54	88
Livorno	1.44	3.85	1.08	5.06	1.68	0.72	0.96	0.24	0.12	0.36		1.55	18
Fermo	1.04	0.00	0.00	0.05	0.30	0.00	0.00	0.00	0.00	0.00		0.13	12
M. Fortino	—	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71		0.08	21
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	28
Roma	0.69	0.77	0.38	0.63	0.47	0.26	0.32	0.26	0.43	0.49		0.47	84
Rocca di Papa	1.68	1.68	0.00	1.68	0.84	4.21	0.00	0.00	0.00	2.10		1.21	25
Velletri	1.25	1.02	0.78	0.89	0.37	0.61	0.16	0.37	0.45	0.30		0.62	323
Ceccano	1.46	—	0.00	0.00	—	—	0.00	0.00	0.00	0.00		0.21	13
Foggia	0.90	0.12	0.21	1.54	0.12	1.54	0.25	0.04	0.17	0.00		0.36	40
Corleone	0.90	0.90	1.63	1.81	2.53	1.99	1.81	1.81	1.27	1.81		1.64	40
Med. gen. diurna	0.93	0.94	0.41	1.03	0.65	0.85	0.34	0.29	0.25	0.51		0.62	843
Decade III.	21	22	23	24	25	26	27	28	29	30			
Bologna	1.03	1.45	0.37	0.43	0.49	0.63	1.18	0.49	0.91	1.18		0.81	65
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.08	0.16	0.16	0.12	0.24	0.06	0.30	0.08	0.26	0.57		0.20	102
Firenze t. n.	0.54	0.83	0.26	0.02	0.09	0.09	0.67	0.43	1.13	0.87		0.47	102
Livorno	0.72	1.92	0.72	0.12	0.24	0.12	1.44	0.31	1.32	0.96		0.78	19
Fermo	0.00	0.00	0.11	0.13	0.03	0.02	0.24	0.31	0.16	1.29		0.22	28
M. Fortino	0.00	0.00	0.00	0.14	—	0.00	1.43	0.14	0.00	0.14		0.20	16
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	21
Roma	0.33	0.68	0.56	0.54	0.52	0.34	0.82	0.61	0.30	1.64		0.63	63
Rocca di Papa	—	—	—	—	0.00	3.37	4.21	0.00	1.34	2.16		1.84	22
Velletri	0.42	0.30	0.17	0.24	0.32	0.34	0.63	0.60	0.51	1.91		0.54	335
Ceccano	0.00	0.00	—	—	0.35	0.00	0.00	0.00	0.00	0.00		0.04	15
Foggia	0.12	0.08	0.25	1.12	0.00	0.21	0.43	0.34	0.69	2.70		0.59	40
Corleone	0.90	1.08	1.81	1.08	1.81	1.44	1.08	1.81	1.81	0.54		1.38	40
Med. gen. diurna	0.34	0.54	0.40	0.85	0.34	0.50	0.95	0.39	0.64	1.07		0.58	868

9-14-18 June 1881 → 7 June 7.95 14 June 5.06 16 June 4.21 (microseismic maximums)

1881-06-09	Basso Vallese
1881-06-14 01:30	Interlaken
1881-06-18 02:50	Carnia

June 12, 1881 06:56:47 Full Moon 21°23'25 362063.98 km

June 18, 1881 21:18:37 Last quarter 27°41'17 376431.65 km

1881 LUGLIO Decade I.	1	2	3	4	5	6	7	8	9	10		Media	N.d'Os.
Bologna	0.37	0.48	0.37	0 31	0.27	0.4:	0 63	0.92	0.63	1.06		0.54	63
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.28	0.2?	0.14	0.26	0.12	0.14	0.14	0.26	2.25	1.32		0.53	89
Firenze t. a.	0.35	0.29	0.20	0.13	0.20	0.13	1.15	1.52	0.76	1.26		0.61	89
Livorno	0.48	0.13	0.35	0.35	0.00	0.12	3.85	3.76	4.04	1.68		1.47	20
Fermo	0.40	0.40	0.06	0.48	0.00	0.00	0.00	0.05	0.10	0.00		0.15	25
M. Fortino	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	18
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00		0.02	25
Roma	1.44	0.30	0 25	0.28	0.41	0.41	0.41	1.13	0.41	0.51		0.55	42
Rocca di Papa	2.88	1.96	1.85	0.95	1.05	0.56	1.32	1.80	0 28	1.26		1.39	56
Velletri	1.81	0.66	0.42	0.40	0.38	0.30	0.38	0.41	0.51	0.64		0.59	309
Ceccano	0.00	0.00	0.00	0.00	—	0.00	—	—	0.00	--		0.00	10
Foggia	2.74	1.93	0.21	2.01	1.07	0.00	0.56	1.49	1.93	0.00		1.20	40
Corleone	0.90	0.72	0.72	1.08	0.90	1.68	1.27	1.44	1.08	1 81		1.08	40
Med. gen. diurna	0 89	0.54	0.35	0.48	0.38	0.28	0.80	1.06	0.92	0.73		0.64	826
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**			
Bologna	0 31	0.75	0.25	0.37	0.37	0.31	0. 81	0.63	1.00	0 87		0.56	60
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a	0.14	0.61	0.04	1.01	0.08	0.14	0.18	0.14	0.12	0.16		0.26	95
Firenze t. n.	0.54	0.04	0.35	0.59	0.17	0.15	0.67	0.31	0.33	0.17		0.33	95
Livorno	1.92	0.24	0.14	0.21	0.24	0.48	1.20	0.48	0.31	0.35		0.56	20
Fermo	1.19	0.76	0.03	0.26	0.00	0.02	0.07	0.09	0.03	0.00		0.24	26
M. Fortino	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	21
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00		0.02	27
Roma	0.53	0.51	0.27	0.41	0.47	0.20	0.10	0.06	0.20	0.32		0.30	32
Rocca di Papa	0.98	1.85	1.68	1.68	0.84	0.00	1.47	—	0.00	2.24		1.19	35
Velletri	0.64	0.68	0.44	0.29	0.48	0.33	0.60	0.43	0.45	0.50		0.48	308
Ceccano	1.76	—	—	—	—	—	0.58	0.00	—	6.16		2 12	13
Foggia	1.29	1.58	1.25	0.90	0.81	0.56	0.38	1.66	0.73	0.43		0.98	40
Corleone	1.08	0.90	—	—	—	—	—	—	—	1.08		1.03	12
Med. gen. diurna	0.79	0.66	0.40	0.52	0.31	0.19	0. 0	0.36	0.28	0.94		0.62	784
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**		
Bologna	1.18	1.27	0.75	0.43	0.81	0.37	2.07	1.55	0 81	1.06	0.63	0.99	67
Rimini	—	—	—	—	—	—	—	—	—	—	—	—	—
Firenze t. a	0.34	1.74	1.28	0.26	0.34	0.41	1.26	1 34	0 41	0.61	0.55	0.77	103
Firenze t. n.	0.65	1.37	1.02	0.47	0.45	0.78	1.28	1.13	0.51	0.41	0.43	0.76	103
Livorno	0.96	6.74	2.16	0.31	0.31	0.79	6.74	2.41	0.60	0.31	0.21	1.96	21
Fermo	0.00	0.22	0.32	0.51	0.02	0.26	1.58	1.83	1.08	0.65	0.05	0.59	34
M. Fortino	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26
Narni	—	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	0.00	0.52	0.17	0.17	0.00	0.35	2.11	0.70	0.00	0.00	0.00	0.36	30
Roma	0.27	0.54	0.61	0.82	0.54	0.61	2.10	0.89	3.43	0.46	0.51	0.98	40
Rocca di Papa	3.70	1.05	0.84	3.87	0.56	0.84	2.52	—	0.00	0.28	0.00	1.31	31
Velletri	0.47	0.58	1.09	1.01	0.52	0.58	1.61	1.55	3 11	0.70	0.29	1.05	362
Ceccano	0.87	0.00	0.58	0.00	0.00	0.00	0.43	1.88	2.13	0.17	0.00	0.55	53
Foggia	0.17	1.88	1.07	1.75	1.49	0.17	2.66	2 62	2.23	0.86	0.00	1.35	44
Corleone	0.72	0.90	0.36	0.9	1.27	1.08	0.9	0.90	1.81	1.63	0.54	1.00	44
Med. gen. diurna	0.71	1.29	0.79	0.77	0.48	0.48	1.94	1.40	1.24	0.55	0.25	0.99	958
1881 AGOSTO Decade I.	1	2	3	4	5	6	7	8	9	10			
Bologna	0.31	0.43	0.92	1.06	1.00	0.69	0.69	0.45	0.69	1.61		0.78	59
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	20
Firenze t. a.	0.21	0.14	0.10	0.51	0.16	0.59	1.32	0.43	0.20	2.01		0.57	105
Firenze t. n.	0.26	0 39	0.39	0.29	0.47	0.33	0.63	0.70	0.39	2.17		0.59	105
Livorno	0.77	0.09	1.44	0.48	0.21	0.12	0.24	0.07	0.14	1.92		0.55	19
Fermo	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0.00	0.00		0.00	35
M. Fortino	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.96	0.00	0 00		0.10	26
Narni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.49	1.62		0.61	30

18-22 July → 20 July 6.16 (microseismic maximum)

1881-07-18	19:30	Fango
1881-07-22		Belledonne-Pelvoux
1881-07-22	02	Genevois (Chaine des Aravis ?)
1881-07-22	02:45	Belledonne-Pelvoux

18 Jul 1881	05:33:40	Last quarter	25°40'18	382853.95 km
26 Jul 1881	05:19:21	New Moon	03°18'15	406581.25 km

Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	—	—	—	—		0.00	17
Roma	0.30	0.28	0.16	0.28	0.21	0.25	0.41	0.69	0.30	0.50		0.33	41
Rocca di Papa	0.00	0.33	1.51	0.00	0.00	0.84	1.96	2.91	0.84	2.52		1.09	34
Velletri	0.42	0.50	0.62	0.46	0.42	0.35	0.80	0.66	0.51	0.87		0.56	339
Ceccano	0.00	0.00	3.28	0.00	0.00	0.00	0.00	—	—	—		0.46	43
Foggia	0.17	0.00	0.69	2.74	1.66	0.69	1.12	0.69	0.25	0.51		0.85	40
Corleone	0.90	1.27	0.72	0.54	0.90	0.36	1.27	1.45	1.45	1.27		1.01	40
Med. gen. diurna	0.23	0.23	0.70	0.42	0.33	0.28	0.60	0.79	0.48	1.38		0.54	958
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**		**Media**	**N.d'Os.**
Bologna	2.45	0.92	0.55	1.61	3.36	0.55	1.18	1.53	1.00	0.75		1.39	65
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	20
Firenze t. a	1.05	0.57	0.21	2.23	1.64	0.83	2.70	2.23	0.65	0.24		1.23	101
Firenze t. n	1.19	0.65	0.76	2.15	2.00	0.91	1.09	2.06	0.80	0.43		1.19	101
Livorno	4.57	1.68	4.09	2.89	1.20	1.44	2.89	5.30	2.89	0.12		2.70	19
Fermo	0.00	0.00	0.00	0.00	0.00	0.06	—	0.57	0.82	0.52		0.22	27
M. Fortino	0.00	0.00	0.71	0.00	1.91	0.00	0.47	3.34	0.00	0.00		0.64	28
Narni	2.72	0.14	0.00	1.49	0.39	0.07	1.63	5.97	0.00	0.81		1.32	21
Viterbo	—	—	—	1.05	1.93	0.00	0.00	—	0.00	—		0.59	10
Roma	0.71	0.00	0.10	0.00	1.03	0.40	0.00	1.16	0.61	0.07		0.40	28
Rocca di Papa	2.24	0.56	1.68	2.52	2.52	2.38	1.68	3.37	0.00	0.00		1.69	32
Velletri	1.02	0.40	0.42	1.20	2.55	1.11	1.68	1.65	0.81	0.41		1.13	339
Ceccano	—	—	—	—	—	—	—	—	0.00	0.12		0.06	10
Foggia	0.98	0.64	0.50	0.43	5.82	3.03	1.88	3.59	0.69	0.69		1.83	40
Corleone	0.90	0.72	1.81	1.27	1.08	0.36	0.72	1.45	1.45	1.63		1.13	40
Med. gen. diurna	1.37	0.48	0.84	1.20	1.81	0.79	1.22	2.47	0.64	0.41		1.12	881
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**		
Bologna	0.68	0.55	0.94	0.51	1.49	1.49	0.87	1.65	1.57	0.82	0.49	1.00	70
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.26	0.00	0.00	0.29	22
Firenze t. a	0.12	0.30	0.14	0.20	0.71	0.13	0.63	1.42	0.69	0.26	0.04	0.42	95
Firenze t. n	0.65	1.09	1.09	1.17	0.87	0.61	0.22	1.56	1.19	0.87	0.85	0.92	95
Livorno	0.48	0.60	1.44	3.61	0.72	0.53	0.14	6.02	2.89	0.48	0.48	1.58	21
Fermo	0.00	0.05	0.43	0.34	0.28	0.20	0.23	0.09	0.00	1.15	0.51	0.29	28
M. Fortino	0.00	2.58	0.00	2.39	1.91	0.00	0.00	5.30	0.00	0.00	0.00	1.10	30
Narni	0.00	3.80	0.00	0.07	0.81	0.00	0.07	0.81	1.49	0.05	0.00	0.64	23
Viterbo	—	—	—	—	—	—	—	1.05	0.17	0.52	0.00	0.43	12
Roma	0.20	0.54	0.68	0.54	0.40	0.56	0.24	0.51	0.71	0.82	0.05	0.47	34
Rocca di Papa	1.68	3.37	0.84	0.56	0.56	0.00	0.00	0.00	0.00	2.10	0.00	0.82	28
Velletri	0.33	0.64	0.74	0.55	0.54	0.91	0.44	3.70	1.24	1.47	0.36	0.99	39
Ceccano	0.17	0.14	0.70	0.10	0.12	0.00	0.00	0.35	0.44	0.00	0.00	0.18	56
Foggia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.97	1.75	2.49	0.00	0.56	44
Corleone	0.72	0.90	0.90	1.45	0.90	0.36	1.27	0.90	1.81	1.63	1.81	1.15	44
Med. gen. diurna	0.35	1.04	0.56	0.82	0.66	0.34	0.29	1.68	1.14	0.84	0.30	0.72	911
1881 SETTEMBRE Decade I.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			
Bologna	2.76	1.55	1.27	0.37	1.62	0.81	3.06	0.63	1.30	1.06		1.44	60
Rimini	0.00	0.00	4.95	1.41	0.00	0.00	0.00	0.00	0.00	1.55		0.79	20
Firenze t. a	0.00	0.18	0.14	0.14	0.22	0.57	0.45	0.53	1.07	2.98		0.63	83
Firenze t. n	1.09	1.02	0.78	0.59	0.70	0.59	2.21	0.22	0.54	0.80		0.85	83
Livorno	7.90	4.82	3.61	2.89	0.24	3.37	—	0.96	3.13	1.80		3.19	16
Fermo	0.13	1.65	0.92	0.38	0.78	0.57	0.98	0.53	0.16	1.19		0.72	23
M. Fortino	0.75	2.87	1.09	0.00	0.00	0.00	7.91	0.47	0.00	0.00		1.30	24
Narni	0.09	6.16	0.00	0.56	0.37	0.00	3.73	0.49	0.54	0.00		1.19	28
Viterbo	1.48	1.05	0.00	0.00	—	—	1.58	0.00	0.00	0.00		0.51	22
Roma	1.31	2.77	0.46	0.00	0.00	0.00	1.43	0.82	0.40	1.25		0.84	42
Rocca di Papa	4.98	1.68	1.68	1.12	0.00	3.37	0.84	0.84	0.56	0.42		1.54	34
Velletri	2.80	2.49	1.56	0.56	0.41	0.38	1.21	0.67	0.42	2.91		1.34	306
Ceccano	2.13	1.50	0.99	0.00	0.00	0.00	0.43	0.00	0.00	0.00		0.50	56
Foggia	1.93	4.28	1.75	0.69	0.51	1.84	2.06	0.51	0.00	1.03		1.46	40
Corleone	2.35	1.63	1.08	0.36	0.18	0.72	0.36	0.18	1.08	0.72		0.86	40
Med. gen. diurna	1.98	2.21	1.35	0.60	0.35	0.87	1.87	0.45	0.61	1.05		1.14	877

August 3, 1881 3.28 ; August 15, 5.82 ; August 28, 6.62

1881-08-03	14:42	Alessandrino
1881-08-05		Belledonne-Pelvoux

3 August 1881	04:42:49	First quarter	10°56'05 383	704.82 km
9 August 1881	21:07:07	Full Moon	17°20'25 357	400.90 km

Decade II.	11	12	13	14	15	16	17	18	19	20	Media	N.d'Os.
Bologna	1.12	1.13	1.12	0.49	0.25	0.84	1.06	0.92	1.49	0.43	0.88	60
Rimini	0.00	1.01	0.00	0.00	1.69	0.00	0.00	0.00	2.54	0.84	0.60	20
Firenze t. a.	0.16	0.71	0.47	0.36	0.04	0.49	0.30	0.36	0.30	0.20	0.32	99
Firenze t. n.	0.54	1.98	0.89	0.83	0.39	0.87	0.59	0.65	0.67	0.74	0.80	99
Livorno	0.84	3.13	2.89	0.96	0.14	1.68	0.48	0.48	0.07	0.24	1.09	20
Fermo	0.19	0.00	0.00	0.78	0.76	0.26	0.91	—	—	0.00	0.36	18
M. Fortino	0.71	0.00	1.43	0.00	0.00	0.47	0.71	0.00	0.00	0.00	0.33	23
Narni	1.49	0.00	0.00	0.00	0.09	0.14	0.61	0.00	0.00	0.05	0.24	26
Viterbo	1.32	0.26	0.00	0.00	0.00	0.00	0.53	0.00	0.00	0.17	0.22	27
Roma	1.64	0.61	0.30	0.00	0.35	0.20	0.86	0.82	0.00	0.00	0.17	26
Rocca di Papa	2.52	1.12	1.12	0.00	0.84	0.00	0.00	1.68	0.00	—	0.80	20
Velletri	1.59	0.93	0.56	0.60	0.62	0.55	1.39	2.00	0.40	0.60	0.92	220
Ceccano	0.73	0.00	0.00	0.00	0.00	0.78	0.21	0.65	0.00	0.00	0.23	50
Foggia	0.90	1.93	0.98	0.29	1.49	2.14	3.34	1.20	0.34	0.64	1.33	40
Corleone	0.99	1.27	1.81	0.72	0.72	0.54	0.90	0.18	0.90	1.63	1.06	40
Med. gen. diurna	1.04	0.93	0.77	0.33	0.49	0.59	0.79	0.59	0.44	0.36	0.64	788
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**		
Bologna	1.24	1.24	3.16	2.99	3.16	1.12	1.76	1.97	2.85	4.48	2.39	62
Rimini	0.00	0.00	0.00	0.00	3.96	3.25	3.67	2.12	1.98	2.54	1.75	20
Firenze t. a.	0.24	2.98	2.80	0.36	0.75	0.47	0.32	2.07	0.28	2.15	1.24	114
Firenze t. n.	0.78	2.54	1.52	1.09	1.15	0.93	0.74	3.55	1.09	2.04	1.54	114
Livorno	0.72	7.71	5.51	1.44	1.34	0.24	0.48	6.26	0.24	2.41	2.10	20
Fermo	0.00	0.15	0.61	0.59	0.76	0.59	1.28	0.05	0.98	0.84	0.55	21
M. Fortino	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.35	—	—	0.16	17
Narni	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	0.35	1.23	1.23	0.70	1.05	1.23	0.88	0.00	1.58	1.76	1.00	28
Roma	0.00	—	1.37	—	1.64	1.64	2.47	0.49	0.00	0.97	1.06	17
Rocca di Papa	0.84	—	2.21	0.00	—	0.42	3.37	0.00	2.02	2.52	1.42	24
Velletri	0.43	1.16	1.26	1.62	1.08	2.54	1.67	0.52	0.71	1.21	1.22	221
Ceccano	0.00	0.00	0.14	0.22	0.00	0.87	0.87	0.17	0.17	0.52	0.29	45
Foggia	0.00	1.97	2.53	2.62	4.06	4.15	0.69	3.71	1.84	3.03	2.46	40
Corleone	0.18	0.90	0.00	1.81	1.45	1.08	0.90	0.72	1.81	0.72	0.95	40
Med. gen. diurna	0.36	1.38	1.49	0.89	1.36	1.23	1.27	1.05	1.03	1.67	1.20	783
1881 OTTOBRE **Decade I.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
Bologna	5.00	4.43	2.29	2.30	1.87	3.29	1.98	2.67	1.24	1.49	2.65	65
Rimini	4.95	2.54	1.83	0.99	0.99	0.28	0.00	0.00	0.00	0.00	1.15	20
Firenze t. a.	1.00	0.81	0.38	0.61	0.61	0.61	1.26	1.70	1.36	1.11	1.00	110
Firenze t. n.	1.93	1.76	0.56	0.83	1.41	1.89	1.96	2.65	0.61	0.80	1.43	110
Livorno	0.48	0.96	0.48	1.44	0.72	4.82	3.43	7.23	2.16	0.38	2.20	20
Fermo	1.15	1.02	1.19	1.90	2.90	1.21	2.69	1.13	1.59	1.38	1.61	20
M. Fortino	—	—	—	—	—	—	—	—	—	—	—	—
Narni	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	2.82	0.39	0.00	0.00	1.19	1.05	1.58	0.79	1.32	0.17	0.93	31
Roma	—	0.41	0.20	0.41	0.88	0.61	0.51	1.02	1.64	0.76	0.71	21
Rocca di Papa	0.00	3.36	0.84	0.00	1.68	1.96	2.24	0.42	1.40	0.00	1.19	28
Velletri	1.38	0.70	0.45	0.43	1.47	0.94	2.22	0.83	1.07	0.76	1.02	315
Ceccano	0.00	0.00	0.00	0.00	0.70	0.00	0.65	0.00	0.00	0.00	0.13	40
Foggia	2.40	1.37	1.41	1.88	1.25	1.88	1.58	0.86	0.86	1.08	1.45	40
Corleone	0.54	1.27	0.90	0.54	0.54	1.45	0.36	0.72	0.36	0.54	0.72	40
Med. gen. diurna	1.85	1.46	0.81	0.87	1.24	1.53	1.57	1.54	1.04	0.64	1.25	860
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**		
Bologna	1.67	1.18	0.63	0.63	1.06	2.79	0.92	0.92	0.87	1.61	1.22	57
Rimini	0.00	0.00	0.00	0.00	0.99	1.69	1.83	0.00	0.00	0.00	0.45	20
Firenze t. a.	1.38	0.69	0.61	1.07	0.24	2.78	0.73	0.61	0.71	2.86	1.15	108
Firenze t. n.	1.52	0.98	0.78	1.28	1.52	1.76	1.02	0.91	1.90	4.35	1.61	108
Livorno	2.89	0.09	0.72	1.20	5.78	3.13	1.20	0.33	0.72	4.57	2.06	19
Fermo	2.25	1.17	1.79	1.00	0.21	1.79	1.71	0.07	0.00	0.31	1.03	20
M. Fortino	—	—	—	0.00	—	—	—	0.00	0.00	0.00	0.00	8
Narni	—	—	—	—	—	—	—	—	—	—	—	—

1 September 7.90 – 2 Sept. 6.16 – 7 Sept. 7.91 – 22 Sept. 7.71 – 23 Sept. 5.51 - 28 Sept. 6.26

1881-09-10 07	Chietino
1881-09-21 21:20	Tarentaise (Moutiers)
1881-09-28	Cesena

September 15, 1881	08:01:40	Last quarter	22°35'30	397730.55 km
September 23, 1881	11:54:48	New Moon	00°34'30	397300.47 km
September 30, 1881	21:48:28	First quarter	07°51'26	372356.18 km

Viterbo	0.00	0.00	0.00	0.79	1.41	0.00	0.26	0.17	0.35	1.32		0.43	25
Roma	0.92	1.06	0.51	0.41	1.02	1.44	1.13	—	0.51	2.06		1.01	26
Rocca di Papa	1.26	0.00	0.42	—	2.36	1.68	0.42	0.84	0.00	1.68		0.96	27
Velletri	0.89	1.30	0.64	0.85	1.05	2.96	1.58	0.79	0.29	1.69		1.20	317
Ceccano	0.00	0.00	0.58	0.00	0.00	0.00	0.43	0.52	0.43	0.00		0.19	33
Foggia	5.43	0.86	0.00	0.69	1.93	4.96	1.41	2.06	0.98	0.69		1.90	40
Corleone	1.63	0.54	1.27	1.27	0.72	1.27	0.90	0.36	1.08	1.08		1.01	40
Med. gen. diurna	1.52	0.60	0.61	0.70	1.40	2.01	1.04	0.58	0.56	1.58		1.06	848
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**Media**	**N.d'Os.**
Bologna	2.24	1.37	2.79	1.87	1.12	1.24	0.75	0.45	0.15	0.82	0.75	1.23	58
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22
Firenze t. a	6.04	2.23	1.03	1.11	2.03	0.51	0.47	0.43	0.71	1.76	1.32	1.60	112
Firenze t. n	2.79	2.00	0.22	1.48	1.35	0.74	1.68	0.87	1.02	0.89	1.76	1.33	112
Livorno	10.12	2.89	10.11	2.65	—	2.16	1.44	0.72	0.72	0.96	2.89	3.46	20
Fermo	0.92	1.34	1.25	0.90	0.90	0.84	0.86	0.98	0.55	1.42	1.15	1.01	23
M. Fortino	1.92	0.00	0.00	0.47	0.71	0.00	0.00	0.00	0.00	1.43	—	0.45	26
Narni	—	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	2.64	0.13	1.05	1.94	0.00	0.35	1.05	0.00	0.26	2.11	3.44	1.17	34
Roma	1.91	1.09	0.00	0.75	0.56	0.92	0.82	0.64	0.82	1.91	2.59	1.09	60
Rocca di Papa	—	—	—	2.52	—	0.00	2.24	0.00	0.00	0.00	0.00	0.68	15
Velletri	3.30	1.12	0.86	1.15	1.48	0.94	0.81	0.32	2.44	2.05	2.39	1.53	364
Ceccano	0.43	0.00	0.35	0.00	0.17	0.00	0.00	0.00	0.00	0.00	1.31	0.20	39
Foggia	3.42	0.86	0.51	1.88	3.76	1.84	0.00	0.34	1.71	2.66	2.40	1.76	44
Corleone	1.81	0.90	0.54	0.54	1.45	1.81	0.90	1.81	2.35	1.45	0.90	1.31	44
Med. gen. diurna	2.88	1.07	1.44	1.23	1.12	0.81	0.78	0.46	0.76	1.24	1.60	1.21	973
1881 NOVEMBRE **Decade I.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			
Bologna	1.30	1.86	0.68	0.52	0.37	0.00	0.25	0.43	0.69	1.61		0.76	58
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a	3.59	0.26	0.73	0.59	0.57	0.38	0.61	0.34	1.76	1.22		0.99	96
Firenze t n	2.24	1.52	1.03	0.70	0.83	0.93	0.85	0.89	1.41	1.74		1.26	96
Livorno	0.96	1.68	1.44	0.72	0.48	0.48	0.00	0.48	3.13	1.20		1.05	18
Fermo	1.19	—	—	—	0.46	0.11	0.65	0.77	3.97	4.53		1.66	12
M. Fortino	1.43	1.91	0.00	0.71	0.00	0.00	0.00	0.45	1.44	0.95		0.68	25
Narni	0.75	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.44		0.14	25
Viterbo	2.17	1.05	0.35	0.00	0.00	0.17	0.00	0.32	1.94	1.85		0.78	36
Roma	5.79	1.40	0.69	0.33	0.20	0.22	0.20	0.26	3.88	1.75		1.47	105
Rocca di Papa	0.00	1.68	2.52	0.84	0.00	0.00	0.00	1.68	1.68	—		0.93	19
Velletri	9.17	2.08	0.44	0.36	0.32	0.16	0.35	0.75	4.78	2.79		2.12	322
Ceccano	2.63	0.43	0.00	0.21	0.00	0.00	0.35	0.00	2.28	1.31		0.72	35
Foggia	4.58	4.40	0.17	0.77	0.18	0.51	0.90	0.86	1.66	4.32		1.91	40
Corleone	1.81	0.54	1.27	0.36	0.90	1.08	1.27	1.08	0.18	1.08		0.95	40
Med. gen. diurna	2.68	1.44	0.78	0.47	0.36	0.28	0.38	0.59	2.05	1.90		1.10	927
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**			
Bologna	1.92	0.30	—	—	—	—	0.75	1.04	1.19	1.06		1.04	33
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a	0.85	0.36	0.43	0.73	0.65	13.33	0.81	1.46	1.01	0.67		2.27	107
Firenze t. n	1.28	0.72	0.96	0.47	0.70	2.37	1.15	1.85	0.70	1.09		1.11	107
Livorno	0.96	0.48	0.96	0.48	0.48	0.55	3.32	2.21	1.44	1.68		1.25	17
Fermo	4.14	1.13	0.26	0.22	0.86	0.70	0.03	3.12	2.11	0.38		1.29	24
M. Fortino	0.47	0.00	0.00	0.00	0.00	0.00	0.00	1.91	0.95	1.43		0.47	25
Narni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.64	0.00		0.16	26
Viterbo	0.79	0.00	0.00	0.00	0.17	0.00	0.00	3.00	1.94	0.70		0.66	26
Roma	1.08	0.53	0.24	0.43	0.32	0.28	0.12	1.25	2.94	0.64		0.78	99
Rocca di Papa	1.68	2.02	0.00	2.10	0.84	0.00	2.80	0.00	0.00	2.52		1.19	29
Velletri	1.76	0.64	0.40	1.10	0.43	4.55	0.28	2.29	5.68	1.08		1.82	333
Ceccano	0.87	0.00	0.00	0.00	0.00	0.00	0.00	3.22	4.92	0.43		0.94	32
Foggia	4.06	2.49	0.81	2.27	2.55	3.08	0.38	1.66	2.95	2.49		2.27	40
Corleone	0.54	1.63	1.27	1.81	2.35	1.63	1.45	2.17	1.81	2.35		1.70	40
Med. gen. diurna	1.45	0.72	0.41	0.74	0.72	2.23	0.79	1.80	2.09	1.18		1.21	938

1 October 4.95 – 11 October 5.43 – 15 October 5.78 – 16 October 4.96 – 21-23 October 10.12

7 October 1881 13:59:21 Full Moon 14°26'15 369396.50 km

1 November 5.79 – 9 November 4.78 – 16 November 13.92 – 19 November 5.68

1881-11-05 08:42	Carinthia, Gmuend
1881-11-14 02:55	Montreux
1881-11-25 17:25	Vaud, Aigle

November 6, 1881 02:03:17 Full Moon 13°49'52 380012.05 km

November 13, 1881 23:01:27 Last quarter 21°45'01 404240.24 km

November 21, 1881 16:21:36 New Moon 29°32'50 375651.69 km

November 28, 1881 12:01:39 First quarter 06°27'09 370979.09 km

Decade III.	21	22	23	24	25	26	27	28	29	30	Media	N.d'Os.
Bologna	0.37	0.82	0 52	1.80	0.75	1.42	1.63	1.49	2 66	1.43	1.28	57
Rimini	—	—	—	—	—	—	—	—	—	—	—	—
Firenze t. a.	0.63	1.07	1.56	0.59	1.68	0.30	0.81	1 28	1.34	1.17	1.03	102
Firenze t. n.	1.02	0.89	0.87	0.70	1.67	0.33	0.72	1.41	2.37	2.30	1.22	102
Livorno	0.96	1.44	0.48	0.60	1.26	0.48	—	—	—	—	0.86	11
Fermo	0.42	0.16	0.12	0.00	0.25	0.09	0.19	0.36	0.28	0.38	0.22	20
M. Fortino	0.00	1.13	0.00	0.04	1.91	0.00	0.00	1.43	0.00	0.00	0.48	24
Narni	0.00	0.15	2.39	0.37	0.15	0.00	0.00	0.00	0.00	0.00	0.30	31
Viterbo	0.60	0.00	0.00	0.00	0.00	0.00	0.00	1.76	1.72	1.90	0.53	30
Roma	0.12	0.23	0.70	0.34	0.31	0.14	0.12	0.75	0.58	0.64	0.39	86
Rocca di Papa	0.00	2.24	1.68	2.94	0.00	1 68	0.00	0.00	0.00	0.00	0.85	25
Velletri	0.38	0.40	0.58	0.26	0.59	0.53	0.45	0.62	0.77	0.69	0.53	340
Ceccano	0.00	0.21	0.58	0.00	1.31	0.00	0.00	0.00	0.58	0.00	0.26	29
Foggia	0.73	0.86	1.03	0.60	0.56	0.51	0.00	1 03	0.17	0.12	0.56	40
Corleone	0.08	0.90	0.18	1.27	1.08	0.72	0.36	1.08	1.63	1.63	0.99	40
Med. gen. diurna	0.40	0.77	0.76	0.68	0.82	0.45	0.33	0.86	0.93	0.79	0.67	937

MEDIE MENSILI

STAZIONI	1880 Dccembre	1880 Gennaio	Febbraio	Marzo	Aprile	Maggio	Giugno	Luglio	Agosto	Settembre	Ottobre	Novembre	Media annua locale	Numero d'Osservazioni
Bologna	0.83	1.97	1.84	0.86	1.01	0.90	0.89	0.69	1.05	1.57	1.70	1.02	1.19	2187
Rimini	0.17	1.44	0.51	0.32	0.29	0.30	—	—	0.09	1.04	0.53	—	0.52	548
Firenze t. a.	1.16	2.72	1.41	0.95	0.93	0.30	0.38	0.52	0.74	0.73	1.24	1.42	1.04	3790
Firenze t. n.	1.09	3.12	1.76	1.32	1.19	0.61	0.70	0.56	0.89	1.06	1.46	1.19	1.21	3789
Livorno	2.15	5.83	1.40	2.62	2.02	1.38	1.46	1.33	1.61	1.99	2.57	1.05	2.11	680
Fermo	0.82	4.00	1.48	1.41	0.58	0.39	0.26	0 32	0.17	0.53	1.21	1.05	1.01	881
M. Fortino	1.52	1.73	1.85	1.14	0.75	1.06	1.37	0.00	0.61	0.59	0.22	0.54	0.94	825
Narni	0.26	1.05	—	1.29	0.97	0.99	—	—	0.85	0.71	—	0.20	0.79	614
Viterbo	0.88	2.68	0.80	0.93	0.50	0.29	0.17	0.13	1.34	0.57	0.84	0.65	0.73	994
Roma	1.11	2.72	1.37	1.44	0.89	0.50	0.61	0.61	0.40	0.79	0.94	0.88	1.02	2539
Bocca di Papa	1.03	2.03	1.17	1.53	1.16	1.06	1.53	1.29	1.20	1.25	.94	0.99	1.26	1058
Velletri	0.89	2.07	1.11	1.44	1.10	0.72	0.73	0.71	0.90	1.16	1.25	1.19	1.12	1169
Ceccano	0.23	1.14	0.72	0.46	0.29	0.48	0.43	0.89	0.23	0.34	0.17	0.61	0.50	1263
Foggia	1.41	2.00	1.68	2.60	1.18	0.85	0.62	1.17	1.08	—	1.70	1.58	1.44	1340
Corleone	1.41	1.48	1.36	1.40	1.41	1.30	1.34	1.03	1.09	0.95	1.01	1.21	1.25	1428
Media generale	0.99	2.43	1.31	1.32	0.95	0.79	0.82	0.75	0.79	0.97	1.17	0.99	1.07	
Tot. delle Osserv.	2751	3083	2579	3017	2871	2935	2661	2568	2745	2328	2081	2802		39021

Cholet
Tours
Digione
Basilea
Sciaffusa
BAVIERA
Zurigo
Salisburgo
Győr
Budapest
Debrecen
Bistrița
Poitiers
Bourges
Besançon
Berna
Itinerari tematici
AUSTRIA
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Oradea
Cluj-Napoca
Niort
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Moulins
Losanna
Laghi e ghiacciai
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Perugia
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Grosseto
Bastia
Terni
Pescara
Mare Adriatico
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SPAGNA
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Bari
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ALBANIA
Salerno
Napoli
Taranto
Véroia
Kariaí
Sassari
Valona
Kozáni
Palma di Maiorca
Sarande
Lárissa
Vólos
Mar Tirreno
Corfù
Ioánnina
Cosenza
Lamia
Cagliari
Sant'Eufemia Lamezia
Agrínion
GRECIA
Catanzaro
Patrasso
Aiyion
Mar Ionio
Atene
Mar Mediterraneo
Palermo
Messina
Athinai
Etna 3323 m
Pírgos
Tripoli
ISOLE EGEE
Biserta
Catania
SICILIA
Algeri
Dellys
Banzart
Bacino dello Ionio -5150 m
Kalámata
Bejaia
Tunisi
Ech Cheliff
Bouira
Costantina
Qacentina
Stif
Al Kāf
Khaniá
Bordj Bou Arreridj
Souk Ahras
Nābul
CRETA
Sougueur
Batna
Monastir
ALGERIA
TUNISIA
La Valletta
Lampedusa
Tébessa
MONTI DELL'ATLANTE
Biskra
Sfax

April 23, 1881 6.74 (Microseismic maximum)

June 9-14-18, 1881 → June 7 7.95 June 14 5.06 June 16 4.21 (microseismic maximums)

July 18-22 → July 20 6.16

August 3, 1881 3.28 ; August 15 5.82 ; 28 August 6.62

1 September 7.90 – 2 Sept. 6.16 – 7 Sept. 7.91 – 22 Sept. 7.71 – 23 Sept. 5.51 - 28 Sept. 6.26 - 1 Oct. 4.95 – 11 Oct. 5.43 – 15 Oct. 5.78 – 16 Oct .96 – 21-23 Oct. 10.12
1 November 5.79 – 9 Nov. 4.78 – 16 Nov. 13.92 – 19 Nov. 5.68

Average seismic maximums:

(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)/7

Input

$$\frac{1}{7}(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)$$

Result

8.488571428571428571428

To this date we add two lines of complete rotations of the apses (2*8.85 years = 17.70 years) and subtract one lunar year:

Apr 8, 2008 + 17.70 years - 354 days 8 hours 48 minutes 36 seconds

Input interpretation

(Tuesday, April 8, 2008 + 17.7 years) – 354 days 8 hours 48 minutes 36 seconds

Result

3:11:24 am CET | Monday, December 30, 2024

From this date we subtract a lunar quarter:

Dec 30, 2024 - 118 days 2 hours 56 minutes 12 seconds

Input interpretation

Monday, December 30, 2024 – 118 days 2 hours 56 minutes 12 seconds

Result

9:03:48 pm CEST | Monday, September 2, 2024

02.09.2024

Or, taking the dates of the following eclipses:

06/09/1755	9.05	Eclisse totale.	Meridionale	5.40	18.36

Let's add two synodic months:

September 6, 1755 + 59 days 1 hour 28 minutes 6 seconds

Input interpretation

Saturday, September 6, 1755 + 59 days 1 hour 28 minutes 6 seconds

Result

1:28:06 am LMT | Tuesday, November 4, 1755

04.11.1755

And from the following date:

02/10/2024	19.46	Eclisse anulare.	Meridionale	6.08	17.49

Subtracting a synodic month:

October 2, 2024 - 29 days 12 hours 44 minutes 3 seconds

Input interpretation

Wednesday, October 2, 2024 – 29 days 12 hours 44 minutes 3 seconds

Result

11:15:57 am CEST | Monday, September 2, 2024

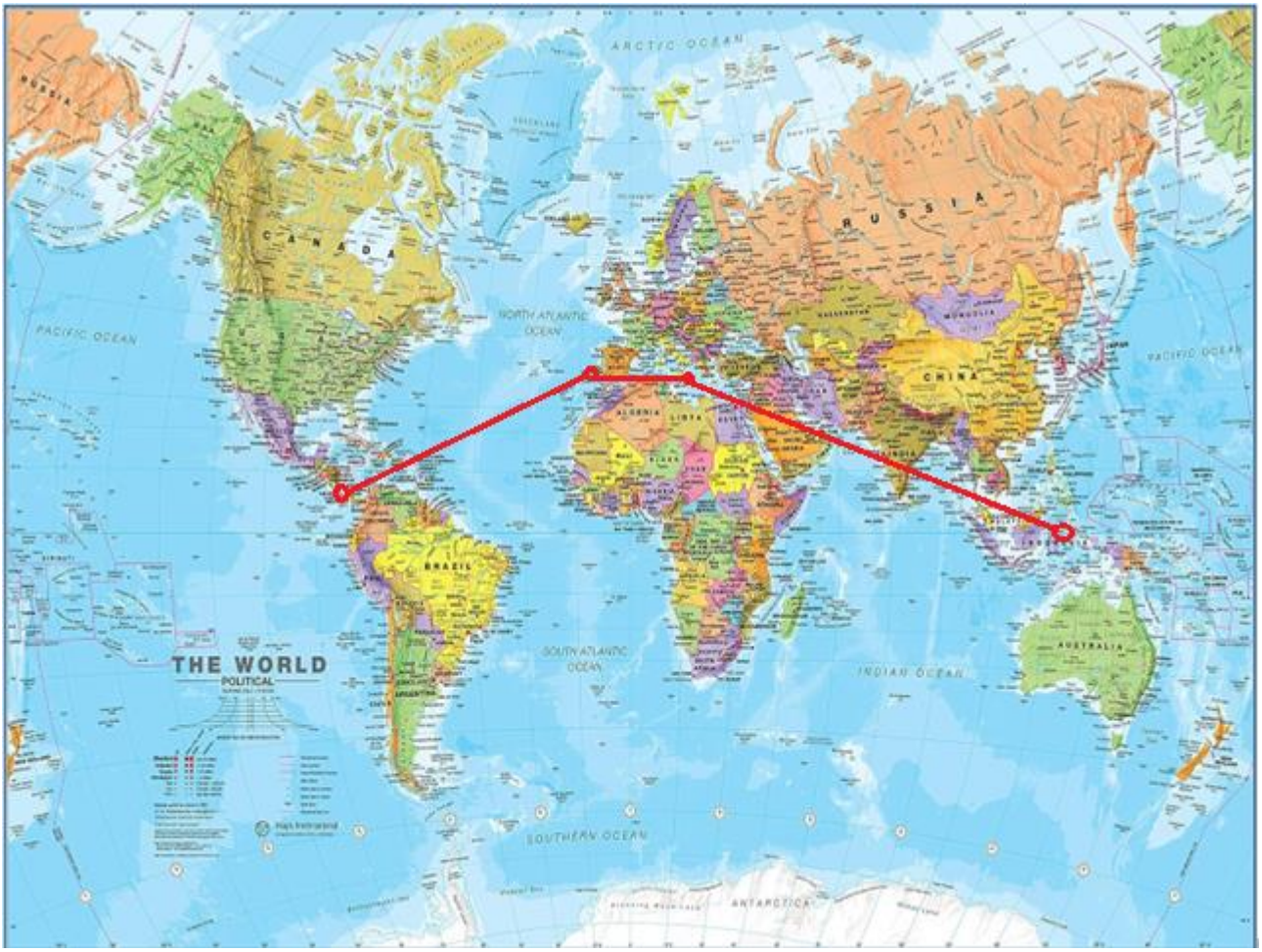
02.09.2024

August 26, 2024

An earthquake measuring 5.3 on the Richter scale was recorded in the early hours of this morning off the coast of the city of Sines, and the tremor was also felt in Lisbon. According to data from the Portuguese Institute of the Sea and the Atmosphere (IPMA), the earthquake had its epicenter in the Atlantic, 70 km southwest of Sesimbra. According to the Portuguese institute, the tremor was felt in Portugal, Spain and Morocco. “Three other aftershocks of the earthquake felt at 5:11 have already been felt, with values of 1.2, 1.1 and 0.9 on the Richter scale,” said André Fernandes, national commander of the Civil Protection. “It is a perfectly normal situation and we are now in a monitoring phase.”

Data e Ora (Italia)	Magnitudo	Zona
2024-08-27 14:47:43	ML 3.9	Mar Ionio Settentrionale (MARE)
2024-08-27 05:39:49	ML 2.9	Tirreno Meridionale (MARE)
2024-08-27 04:15:20	**Mwp 5.8**	**Indonesia [Sea]**
2024-08-26 15:14:15	ML 2.1	4 km SW Serravalle di Chienti (MC)
2024-08-26 11:47:42	ML 2.3	3 km SE Fontanelice (BO)
2024-08-26 07:08:45	**Mwp 5.8**	**South of Panama [Sea: Panama]**
2024-08-26 06:34:38	ML 2.0	3 km W Apricena (FG)
2024-08-26 06:11:38	**mb 5.0**	**Portugal [Sea]**
2024-08-26 03:34:32	ML 2.2	4 km SE Castel del Rio (BO)
2024-08-26 03:05:44	ML 2.0	Confine Italia Svizzera (SVIZZERA)
2024-08-26 02:02:06	ML 2.4	Borgo Tossignano (BO)

Data e Ora (Italia)	Magnitudo	Zona
2024-08-26 01:53:02	ML 2.3	2 km N Borgo Tossignano (BO)
2024-08-26 01:45:43	ML 3.9	3 km SE Castel del Rio (BO)
2024-08-26 01:29:09	**Mwp 6.8**	**Tonga Islands [Sea: Tonga]**



On **February 16, 1861**, there was a very violent earthquake in Sumatra, Indonesia. These are the lunar phases of that period:

9 February 1861 20:04:38 New Moon 21°07'47 396863.84 km

18 February 1861 00:19:42 First Quarter 29°23'17 398290.59 km

To this date we add 1 Saros Cycle and subtract 2 synodic months:

february 16, 1861 + 108 years 68 days 4 hours 12 minutes - 58.54 days

Input interpretation

(Saturday, February 16, 1861 + 108 years 68 days 4 hours 12 minutes) –
58.540 days

Result

3:14:24 pm CET | Tuesday, February 25, 1969

This date (February 25, 1969) is very close to the date of **February 28, 1969**, when there was a strong earthquake that hit Portugal and Morocco.

March 4, 1969 05:17:03 Full Moon 13°27'39 387679.14 km

Let's add to this date 3 Saros cycles:

February 25, 1969+54 years 34 days 2 hours 6 minutes

Input interpretation

Tuesday, February 25, 1969 + 54 years 34 days 2 hours 6 minutes

Result

2:06 am CEST | Friday, March 31, 2023

We note that:

20/04/2023	5.24	Eclisse totale.	Meridionale	5.23	18.56

Adding to the date obtained above 5 synodic months:

March 31, 2023 + 146 days 8 hours 24 minutes

Input interpretation

Friday, March 31, 2023 + 146 days 8 hours 24 minutes

Result

8:24 am CEST | Thursday, August 24, 2023

To that date, adding 1 lunar year, we get:

August 24, 2023 + 354 days 8 hours 48 minutes 36 seconds

Input interpretation

Thursday, August 24, 2023 + 354 days 8 hours 48 minutes 36 seconds

Result

8:48:36 am CEST | Monday, August 12, 2024

Doing the same calculation with the date of the eclipse:

April 20, 2023 + 146 days 8 hours 24 minutes

Input interpretation

Thursday, April 20, 2023 + 146 days 8 hours 24 minutes

Result

8:24 am CEST | Wednesday, September 13, 2023

Adding to this date a synodic year:

September 13, 2023 + 354 days 8 hours 48 minutes 36 seconds

Input interpretation

Wednesday, September 13, 2023 + 354 days 8 hours 48 minutes 36 seconds

Result

8:48:36 am CEST | Sunday, September 1, 2024

Both dates, **August 12** and **September 1, 2024**, are close to **August 26, 2024**, the date of the 5.3 magnitude earthquake that occurred in Portugal.

August 26, 2024 09:25:50 Last quarter 03°38'10 376666.64 km

September 3, 2024 01:55:34 New Moon 11°04'12 403894.36 km

Let's go back to the date of November 1, 1755 (Lisbon Earthquake). Here is the lunar phase of that period:

November 4, 1755 03:08:41 New Moon 11°24'50 356902.18 km

Let's add to it 5 Saros cycles:

November 1, 1755 + 90 years 56 days 19 hours 30 minutes

Input interpretation

Saturday, November 1, 1755 + 90 years 56 days 19 hours 30 minutes

Result

7:30 pm LMT | Saturday, December 27, 1845

Adding 1 Saros cycle to the result obtained:

December 27, 1845 + 18 years, 11 days, 8 hours and 42 minutes

Input interpretation

Saturday, December 27, 1845 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am LMT | Thursday, January 7, 1864

Subtracting 3 synodic years from the above result, we obtain:

January 7, 1864 - 1063 days 2 hours 25 minutes 48 seconds

Input interpretation

Thursday, January 7, 1864 – 1063 days 2 hours 25 minutes 48 seconds

Result

9:34:12 pm LMT | Thursday, February 7, 1861

Result close to the date of **February 16, 1861**, in which there was a very violent earthquake in Sumatra (Indonesia)

February 9, 1861 20:04:38 New Moon 21°07'47 396863.84 km

February 18, 1861 00:19:42 First quarter 29°23'17 398290.59 km

Let's now analyze these additional earthquakes, which occurred close to eclipse dates, in the Urbino area (Marche):

14/04/1828	10.24	Eclisse totale.	Settentrionale	5.32	18.50

1828. ***Aprile, notte dal 13 al 14.*** **Fortissimo.**

01/02/1851	6.57	Eclisse anulare.	Meridionale	7.24	17.25

1851. ***11 Febbraio.*** **Il conte Domenico Paoli da Pesaro mi scrisse che ivi ebbero a ore 5. 11' circa (credo pomeridiane) una piccola scossa di terremoto.**

1851. ***28 Maggio, 9 pom.*** **Terremoto della vigilia dell'Ascensione. Fu sentito anche a Cortona e a Castiglione (presso Cortona) qualche minuto prima delle 9 pom., nella direzione da N a S, e con mediocre intensità. Lo sentirono anche Siena, Firenze, Lucca.**

06/06/1853	21.07	Eclisse anulare.	Meridionale	4.35	19.42

1853. *22 Giugno, 0. 28' ant.* Assai gagliardo.

26/05/1854	21.46	Eclisse anulare.	Settentrionale	4.41	19.33

1854. *22 Maggio, 3. 36' pom.* Due leggiere scosse di 2'' l'una, coll'intervallo di forse 2''. Qualcuno crede aver notata la direzione verso NE.

1854. *16 Giugno, 2. 31' pom.* Terremoto per circa 8'' ondulatorio per SW-NE. È cominciato con movimento sussultorio, e poi un momento quietò, e poi riprese per 2'' o 3. Il vento SW rinforzò dopo il terremoto. È stato sentito anche a Bologna.

29/09/1856	4.58	Eclisse anulare.	Settentrionale	6.05	17.55

1856. *31 Agosto, 3. 37' ant.* Terremoto piuttosto lungo da E a W. Il barometro è alto, e alza sempre più.

1856. *12 Ottobre, 2. 0 ant.* Prolungato, ma non forte.

25/03/1857	23.30	Eclisse totale.	Meridionale	6.05	18.28
18/09/1857	6.36	Eclisse anulare.	Settentrionale	5.53	18.15

1857. *15 Marzo, 6. 45' (ant.?).* Scossa ondulatoria sentita da parecchi da E a W.

1857. *3 Settembre, 5. 0 ant.* Ondulatorio.

18/07/1860	15.24	Eclisse totale.	Settentrionale	4.50	19.41

1860. *15 Luglio, 2. 3/4 ant.* Cinque piccole ondulazioni.

31/12/1861	14.50	Eclisse totale.	Settentrionale	7.38	16.49

1861. *7 Dicembre, 10. 1/2 ant.* Prima scossa per 4 secondi, che ha fatto sonare qualche campanello; ondulatoria, nella direzione probabile da E a W, seguita da una seconda assai più debole.

1861. *8 Dicembre, 5. 1/2 ant.* Si ripete un piccolo terremoto. È curioso che questa ripetizione si fa in ordine al tempo come nel marzo.

19/10/1865	17.21	Eclisse anulare.	Settentrionale	6.27	17.23

1865. *24 Settembre*, 11. 1/2 *ant.* Piuttosto forte, ma breve.

06/03/1867	10.48	Eclisse anulare.	Settentrionale	6.38	18.06

1867. *29 Marzo*, 7. 25' *pom.* Urto assai violento, seguito da un nuovo urto più debole; e poi agitazione vaga crescente per circa 5''. La direzione prevalente sembrò da W a E.

1867. *30 Marzo*, 4. 10' *ant.* Altra minima scossa sentita da pochi.

18/08/1868	6.12	Eclisse totale.	Meridionale	5.21	19.05

1868. *2 Agosto*, 10. 15' *pom.* Lieve.

1868. *26 Agosto*, 8. 42' *ant.* Ondulatorio per 8'', con piccola tregua dopo i primi quattro.

31/01/1870	16.31	Eclisse parziale. Magnitud. = 0,47	Meridionale	7.24	17.24
29/06/1870	0.45	Eclisse parziale. Magnitud. = 0,64	Meridionale	4.37	19.49
22/12/1870	13.31	Eclisse totale.	Settentrionale	7.35	16.43

1870. *8 Febbraio, 5. o pom. circa.* Forte scossa preceduta da romba sotterranea. Ha fatto sonare qualche campanello.

1870. *1 Marzo, 8. 40' pom.* Due scosse assai sensibili.

1870. *24 Giugno, 6. o pom. circa.* Due scosse ondulatorie; la prima leggiera, la seconda più sensibile, però avvertite da pochi.

1870. *21 Novembre, o. 15' ant.* Ondulatorio.

22/12/1870	13.31	Eclisse totale.	Settentrionale	7.35	16.43

1871. *6 Gennaio, 11. o pom. circa.* Terremoto.

18/06/1871	3.34	Eclisse anulare.	Meridionale	4.34	19.48

1871. *2 Giugno, 10. 45' pom.* Terremoto.

30/11/1872	19.26	Eclisse totale.	Meridionale	7.18	16.40

1872. *2 Novembre, 1. 26' pom.* Due scosse ondulatorie, con un minuto d' intervallo. La prima più forte durò circa 6", la seconda circa 4".

26/05/1873	10.13	Eclisse parziale. Magnitud. = 0,89	Settentrionale	4.40	19.34

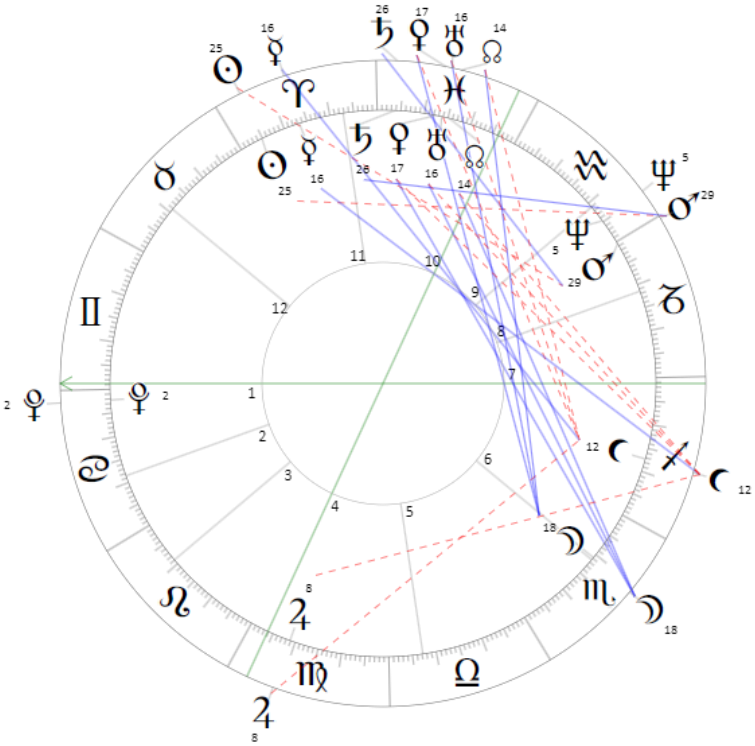
1873. *7 Maggio, 8. 11' ant.* Lieve scossa sentita da pochissimi. Alla stessa ora fu sentito distintamente a Cagli.

1873. *20 Maggio, 4. 45' ant.* A Macerata (Marche) forte scossa, ma di breve durata.

April 14, 1672 strong earthquake in Rimini

28/02/1672	15.51	Eclisse anulare.	Meridionale	6.48	17.59

March 6, 1672 → Jupiter opposition



Luna → Urano-Venere

April, 14 1672 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Thursday, April 14, 1672 (Gregorian calendar) +
108 years 68 days 4 hours 12 minutes

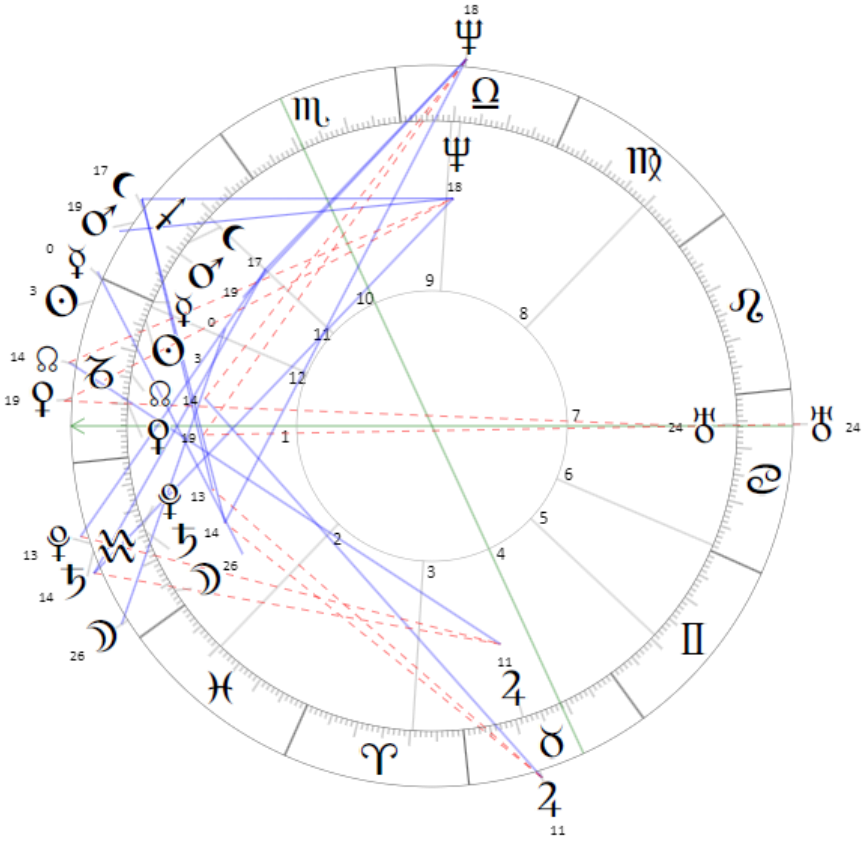
Result

4:12 am LMT | Wednesday, June 21, 1780

December 25, 1786 strong earthquake in Rimini

20/12/1786	18.03	Eclisse parziale. Magnitud. = 0,07	Meridionale	7.34	16.42

January 4, 1787 - Inferior Conjunction of Venus



Luna → Plutone-Saturno ; Giove → Venere ; Urano → Venere ; Nettuno → Venere

Giove → Urano → Nettuno → Venere

December 25, 1786 + 108 years 68 days 4 hours 12 minutes

Input interpretation

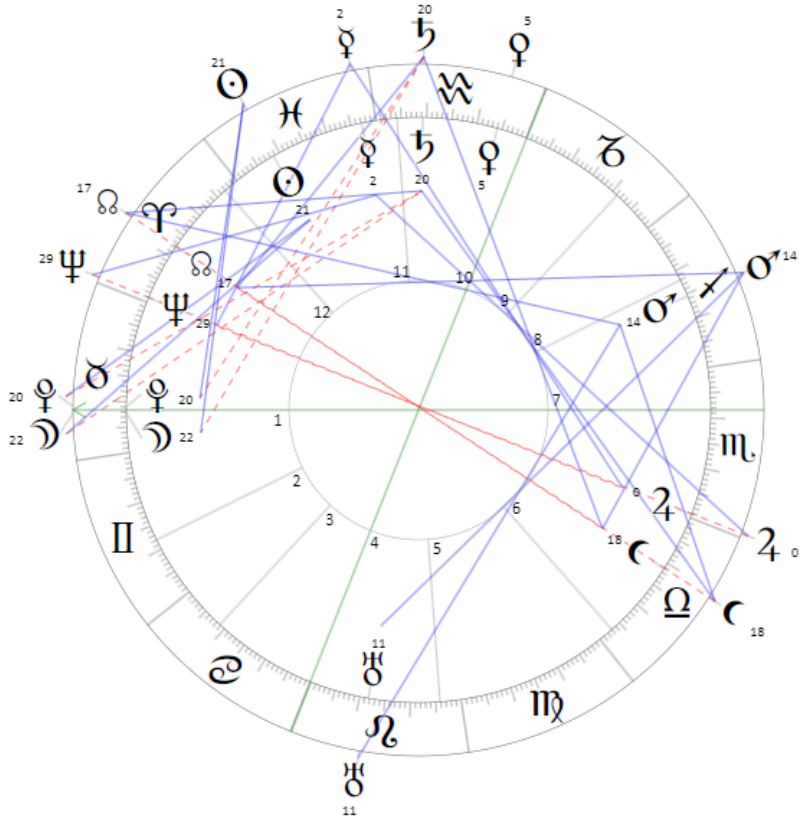
Monday, December 25, 1786 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CET | Sunday, March 3, 1895

March 12, 1875 strong earthquake in Rimini

06/04/1875	7.37	Eclisse totale.	Meridionale	5.45	18.40



Saturno → Luna ; Giove → Nettuno

March, 12 1875 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Friday, March 12, 1875 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Thursday, May 19, 1983

April, 14 1672 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Thursday, April 14, 1672 (Gregorian calendar) +
108 years 68 days 4 hours 12 minutes

Result

4:12 am LMT | Wednesday, June 21, 1780

June 21, 1780 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Wednesday, June 21, 1780 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am RMT | Tuesday, August 28, 1888

August 28, 1888 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Tuesday, August 28, 1888 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CET | Monday, November 4, 1996

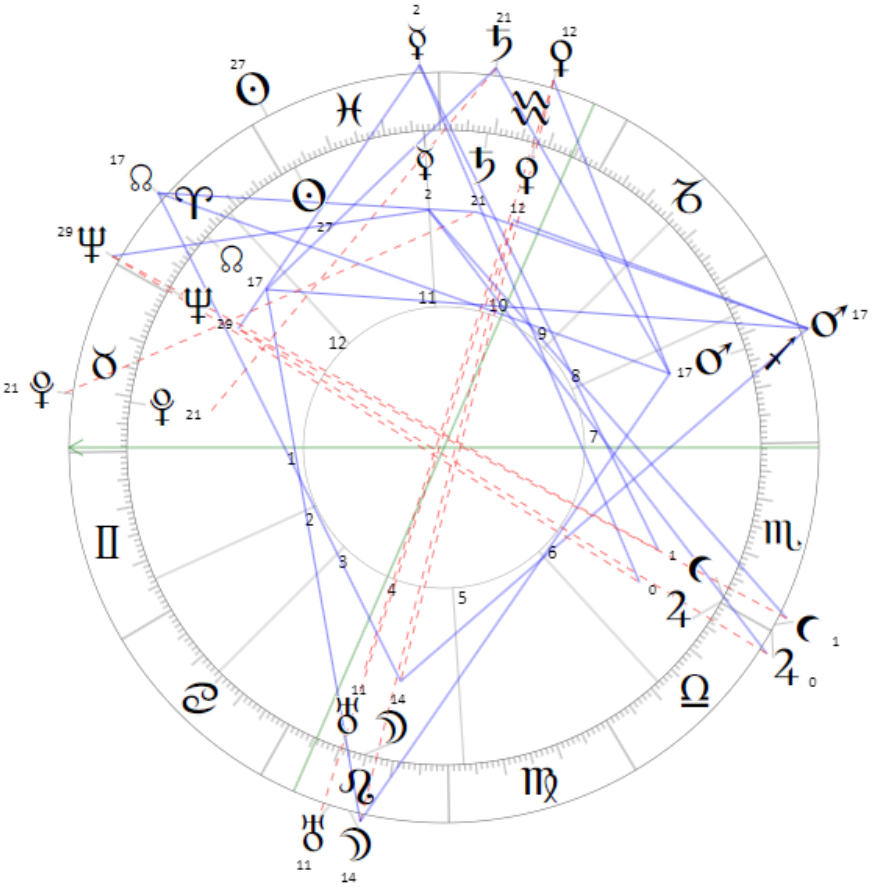
On the earthquake of March 17-18, 1875

Moon phases:

March 14, 1875 13:05:40 First quarter 23°34'14 373234.63 km

March 21, 1875 23:51:50 Full Moon 00°58'17 398418.84 km

Transit sky of Thursday, March 18, 1875 at 08:00:00, Rome, Italy



Venere-Luna ; Giove-Nettuno ; Mercurio-Giove ; Venere-Urano

Mercurio-Saturno-Giove; → Venere-Luna-Urano ; Mercurio-Saturno-Giove

Now, let's consider the date of a strong eruption of Vesuvius. The spectacular and dramatic eruption of 1872 began on April 24 and finally ended on May 2. To this date, let's add 8 Saros cycles:

April 24, 1872 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Wednesday, April 24, 1872 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Saturday, July 23, 2016

July 23, 2016

Seismicity prior to the event of August 24, 2016 of magnitude Mw 6.0 between the provinces of Rieti and Perugia, is the following:

The events of greater magnitude were located respectively on July 5, 2016 (ML 3.9) in the Ionian Sea and on July 30, 2016 (Mw 3.7) in the province of Turin.

Let's note the lunar phases:

July 4, 2016 11:01:00 New Moon 12°53'32 371871.68 km

August 2, 2016 20:44:33 New Moon 10°57'46 382285.88 km

2016-07-30 22:40:05	ML 2.5	Confine Italia Austria (AUSTRIA)	5	47.23	11.75
2016-07-30 22:25:08	ML 2.1	3 km NW Pramollo (TO)	14	44.93	7.19
2016-07-30 22:21:38	Mw 3.7	2 km SW Pinasca (TO)	15	44.93	7.21
2016-07-30 22:01:11	ML 2.6	2 km NE Gravina in Puglia (BA)	9	40.84	16.43
2016-07-30 06:49:25	ML 2.2	Costa Siciliana nord orientale (Messina)	118	38.38	15.40
2016-07-30 03:19:32	ML 2.3	Adriatico Centrale (MARE)	35	43.43	14.39

2016-08-05 22:18:17	ML 2.6	Costa Marchigiana Anconetana (Ancona)	6	43.57	13.76
2016-08-05 16:00:10	ML 2.1	3 km E Arquata del Tronto (AP)	14	42.78	13.33
2016-08-05 13:28:17	ML 2.0	Costa Siciliana nord orientale (Messina)	113	38.33	15.18
2016-08-04 20:51:07	ML 2.3	5 km E Bagno di Romagna (FC)	8	43.85	12.05
2016-08-04 12:14:17	ML 3.6	Tirreno Meridionale (MARE)	322	38.79	14.65
2016-08-03 20:56:23	ML 2.2	4 km SW Oliveri (ME)	8	38.10	15.02
2016-08-02 14:33:10	ML 2.4	Adriatico Centrale (MARE)	10	42.25	15.91
2016-08-02 05:14:37	ML 2.1	5 km SE Sapri (SA)	10	40.04	15.67
2016-08-01 23:39:37	ML 2.0	8 km SW Palazzuolo sul Senio (FI)	7	44.05	11.51
2016-08-01 16:03:32	ML 2.6	Adriatico Meridionale (MARE)	9	41.64	16.76
2016-08-01 16:02:09	ML 2.2	5 km NW Potenza (PZ)	23	40.66	15.76
2016-08-01 05:34:18	ML 2.3	1 km NE Romagnano al Monte (SA)	10	40.63	15.45
2016-08-01 02:16:42	ML 2.2	Costa Siciliana nord orientale (Messina)	113	38.27	15.19

2016-07-06 00:53:19	ML 2.7	1 km NE San Carlo Canavese (TO)	36	45.26	7.62
2016-07-05 07:54:37	ML 3.9	Mar Ionio Meridionale (MARE)	41	37.50	17.05
2016-07-05 01:37:10	Md 2.0	4 km SW Sant'Arcangelo (PZ)	25	40.21	16.26
2016-07-04 20:37:00	ML 2.0	1 km S Felonica (MN)	11	44.98	11.35
2016-07-04 15:21:48	ML 2.2	Tirreno Meridionale (MARE)	147	38.60	15.52
2016-07-04 13:37:22	ML 3.5	8 km SW Felonica (MN)	9	44.93	11.29
2016-07-04 12:22:02	ML 3.3	Tirreno Meridionale (MARE)	251	38.87	15.44
2016-07-04 00:53:12	ML 2.8	1 km SW Montieri (GR)	10	43.12	11.01
2016-07-03 17:44:44	ML 3.0	3 km E Roccaraso (AQ)	11	41.86	14.11
2016-07-03 12:14:13	ML 2.5	5 km S Serracapriola (FG)	14	41.77	15.17
2016-07-03 10:28:47	ML 2.1	1 km SE Casina (RE)	23	44.51	10.51
2016-07-02 19:06:51	ML 2.2	2 km E Tizzano Val Parma (PR)	24	44.53	10.23
2016-07-02 14:11:14	ML 2.1	Costa Calabra sud orientale (Reggio di Calabria)	27	37.64	15.83

2016-07-02 10:04:39	ML 3.1	Mar Ionio Meridionale (MARE)	43	37.18	19.16
2016-07-02 04:29:54	ML 2.3	Costa Siciliana nord orientale (Messina)	117	38.37	15.44
2016-07-01 06:51:14	ML 2.3	1 km NE Terme Vigliatore (ME)	8	38.14	15.17
2016-06-30 05:53:00	ML 2.0	1 km NE Terme Vigliatore (ME)	8	38.14	15.17
2016-06-30 05:10:06	ML 2.4	5 km S Acquasanta Terme (AP)	22	42.73	13.42
2016-06-30 03:45:24	ML 2.1	1 km N Tizzano Val Parma (PR)	23	44.53	10.20

The date we get from the previous calculation is July 23, 2016, when an earthquake occurred in the Aeolian Islands:

Data e Ora (Italia)	Magnitudo	Zona	Profondità	Latitudine	Longitudine
2016-07-23 05:18:59	ML 2.0	Isole Eolie (Messina)	9	38.66	14.34

The **2016-2017 seismic sequence of Central Italy**, defined by the INGV as the **Amatrice-Norcia-Visso seismic sequence**, began in **August 2016** with epicenters located between the Sibillini Mountains, the upper Tronto Valley, the Laga Mountains and the Alto Aterno Mountains. The first strong shock occurred on August 24, 2016, at 3:36 am and had a magnitude of 6.0, with the epicenter located along the Tronto Valley, between the municipalities of Accumoli (RI) and Arquata del Tronto (AP).[15] Two powerful aftershocks occurred on 26 October 2016 with epicentres on the Umbria-Marche border, between the municipalities of Visso, Ussita and Castelsantangelo sul Nera in the province of Macerata (the first shock at 7.11pm with a magnitude of 5.4 and the second at 9.18pm with a magnitude of 5.9).

The dates of the eclipses/lunar phases closest to that of the first strong earthquake in the sequence are:

01/09/2016	10.09	Eclisse anulare.	Meridionale	5.36	18.43

Thursday, August 25, 2016 03:40:50 Last quarter 02°22'17 370770.23 km

Thursday, September 1, 2016 09:03:06 New Moon 09°21'11 392890.00 km

Data e Ora (Italia)	Magnitudo	Zona	Profondità	Latitudine	Longitudine
2016-08-24 03:46:12	ML 3.7	8 km E Norcia (PG)	7	42.76	13.18
2016-08-24 03:44:56	ML 3.2	2 km W Amatrice (RI)	11	42.63	13.27
2016-08-24 03:44:38	ML 2.7	4 km SE Accumoli (RI)	11	42.68	13.29
2016-08-24 03:43:58	ML 3.4	5 km NW Accumoli (RI)	11	42.73	13.21
2016-08-24 03:42:07	ML 3.6	5 km E Norcia (PG)	10	42.78	13.16
2016-08-24 03:41:38	ML 3.9	6 km E Norcia (PG)	10	42.78	13.17
2016-08-24 03:40:46	ML 3.2	7 km E Norcia (PG)	10	42.77	13.17
2016-08-24 03:37:26	**ML 4.5**	**2 km N Accumoli (RI)**	9	42.71	13.25
2016-08-24 03:36:32	**Mw 6.0**	**1 km W Accumoli (RI)**	8	42.70	13.23
2016-08-24 02:51:41	ML 2.8	Tirreno Meridionale (MARE)	26	38.71	13.85

Data e Ora (Italia)	Magnitudo	Zona	Profondità	Latitudine	Longitudine
2016-09-01 14:05:59	ML 2.1	4 km NW Amatrice (RI)	13	42.65	13.25
2016-09-01 13:35:57	Mw 3.3	4 km N Capitignano (AQ)	11	42.56	13.30
2016-09-01 13:31:05	ML 2.4	8 km SE Norcia (PG)	10	42.76	13.18
2016-09-01 13:10:06	ML 2.2	5 km N Capitignano (AQ)	11	42.56	13.31
2016-09-01 13:02:43	ML 3.1	6 km E Norcia (PG)	11	42.81	13.17
2016-09-01 12:16:04	ML 2.6	2 km NE Amatrice (RI)	13	42.65	13.30
2016-09-01 11:40:29	ML 3.1	6 km NW Arquata del Tronto (AP)	10	42.81	13.24
2016-09-01 10:14:36	ML 2.0	5 km S Amatrice (RI)	11	42.58	13.30
2016-09-01 08:54:22	ML 2.9	Canale di Sicilia meridionale (MARE)	52	36.22	12.65
2016-09-01 08:49:34	ML 3.2	8 km SE Castelsantangelo sul Nera (MC)	10	42.85	13.23
2016-09-01 08:34:39	ML 2.0	1 km SE Arnara (FR)	14	41.58	13.40
2016-09-01 07:57:30	ML 2.1	6 km W Montegallo (AP)	9	42.86	13.26
2016-09-01 07:56:24	ML 2.2	7 km NW Accumoli (RI)	11	42.74	13.19
2016-09-01 07:51:52	ML 2.3	2 km E Norcia (PG)	13	42.79	13.12
2016-09-01 06:54:14	ML 2.5	2 km NE Capitignano (AQ)	18	42.53	13.32
2016-09-01 06:35:33	ML 2.0	6 km W Campotosto (AQ)	11	42.57	13.31
2016-09-01 06:00:12	ML 2.2	2 km E Amatrice (RI)	9	42.63	13.31
2016-09-01 05:53:04	Mw 3.6	2 km SE Amatrice (RI)	9	42.62	13.31
2016-09-01 05:43:22	ML 2.9	6 km E Norcia (PG)	9	42.77	13.16
2016-09-01 05:42:05	ML 2.1	6 km SW Amatrice (RI)	10	42.58	13.27
2016-09-01 05:12:57	ML 2.2	6 km E Norcia (PG)	14	42.77	13.16
2016-09-01 05:08:18	ML 2.3	3 km SE Amatrice (RI)	10	42.61	13.31
2016-09-01 04:32:48	ML 2.3	1 km SE Comunanza (AP)	20	42.95	13.42
2016-09-01 04:31:57	ML 2.2	1 km SE Fagnano Alto (AQ)	8	42.25	13.59
2016-09-01 03:59:06	ML 2.0	6 km E Norcia (PG)	10	42.77	13.16
2016-09-01 03:55:52	ML 3.2	6 km SE Castelsantangelo sul Nera (MC)	15	42.84	13.18
2016-09-01 02:21:47	ML 2.0	6 km NW Accumoli (RI)	13	42.74	13.20
2016-09-01 02:08:26	ML 2.1	4 km NE Cittareale (RI)	12	42.65	13.19

Now, from the previous results we got: 23°34'14", 29° 23'; 21° 07' and 11°24', let's analyze the following three earthquakes:

Lisbona 38°42′N 9°11′W

Sumatra 3°35′N 98°40′E

Rimini 44°03′34″N 12°34′06″E

We perform the following calculations:

2*(23°34'14")-2((2sqrt2)/Pi)°

Input interpretation

$$2\,(23\text{ degrees }\ 34\text{ arcminutes }\ 14\text{ arcseconds}) - 2\times\frac{2\sqrt{2}}{\pi}{}^\circ\ \text{(degrees)}$$

Results

45 degrees 20 arcminutes 25.72 arcseconds

1/2(23°34'14")+((2√2)/Pi)°

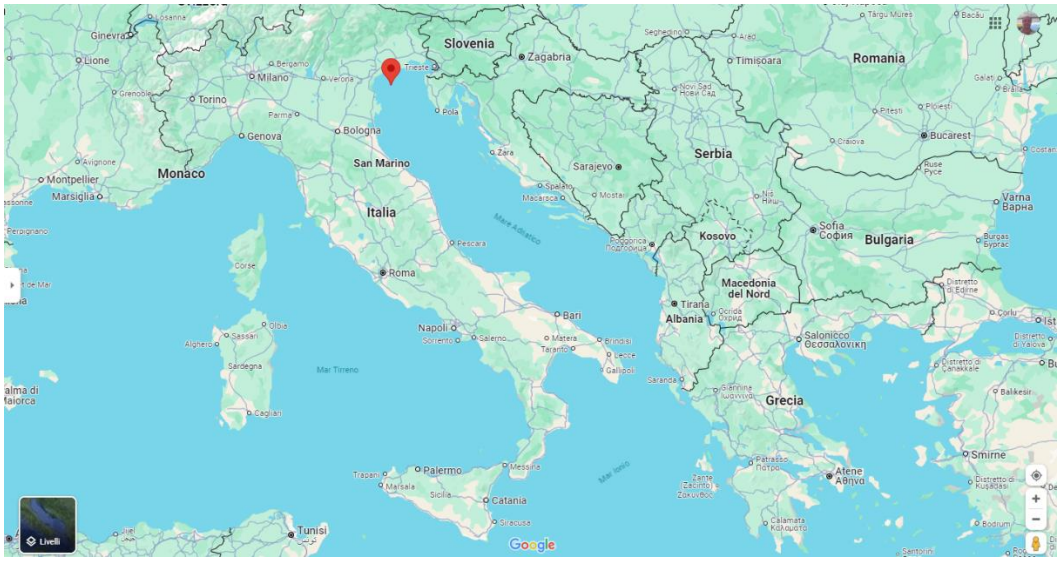
Input interpretation

$$\frac{1}{2}\,(23\text{ degrees }\ 34\text{ arcminutes }\ 14\text{ arcseconds}) + \frac{2\sqrt{2}}{\pi}{}^\circ\ \text{(degrees)}$$

Results

12 degrees 41 arcminutes 8.139 arcseconds

45°20'00.0"N 12°41'00.0"E (sea in front of Jesolo)



((29° 23') - (21° 07'))/2 - ((2sqrt2)/Pi)°

Input interpretation

$$\frac{1}{2}(29 \text{ degrees } 23 \text{ arcminutes} - 21 \text{ degrees } 7 \text{ arcminutes}) - \frac{2\sqrt{2}}{\pi}° \text{ (degrees)}$$

Results

3 degrees 13.98 arcminutes

2((29° 23') + (21° 07'))-((2sqrt2)/Pi)°

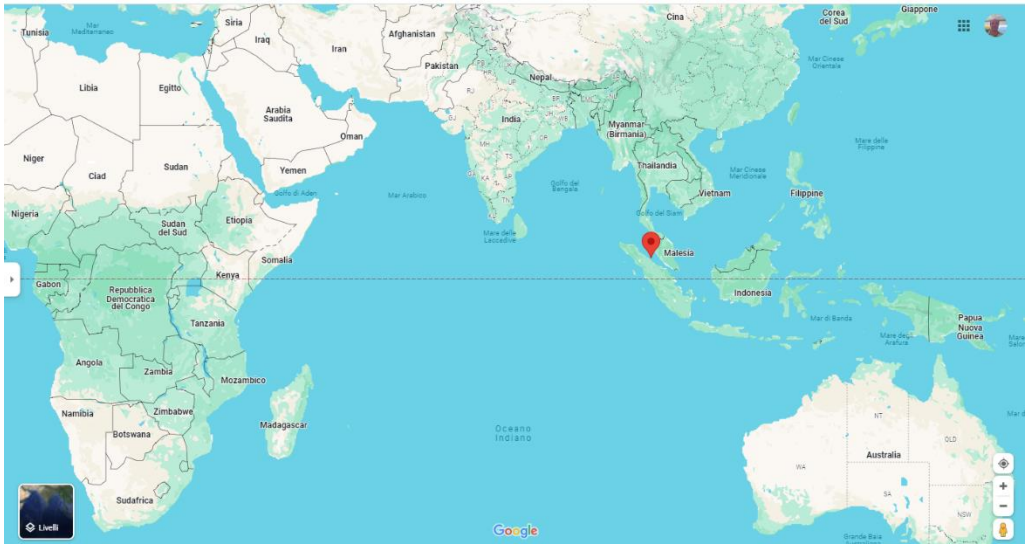
Input interpretation

$$2\,(29\text{ degrees}\;\;23\text{ arcminutes} + 21\text{ degrees}\;\;7\text{ arcminutes}) - \frac{2\sqrt{2}}{\pi}\,^\circ\ \text{(degrees)}$$

Results

100 degrees 5.981 arcminutes

3°14'00.0"N 100°06'00.0"E (Straits of Malacca)



3*(11°24')+5((2sqrt2)/Pi)°

Input interpretation

$$3\,(11\text{ degrees}\;\;24\text{ arcminutes}) + 5\times\frac{2\sqrt{2}}{\pi}\,^\circ\ \text{(degrees)}$$

Results

38 degrees 42.09 arcminutes

(11°24')-2((2sqrt2)/Pi)°

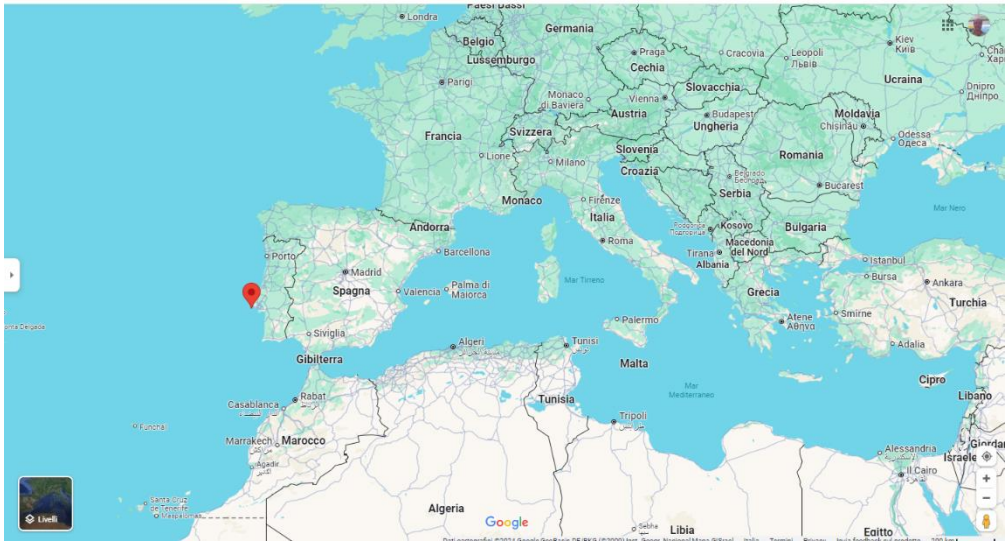
Input interpretation

$$11 \text{ degrees } 24 \text{ arcminutes} - 2 \times \frac{2\sqrt{2}}{\pi}° \text{ (degrees)}$$

Results

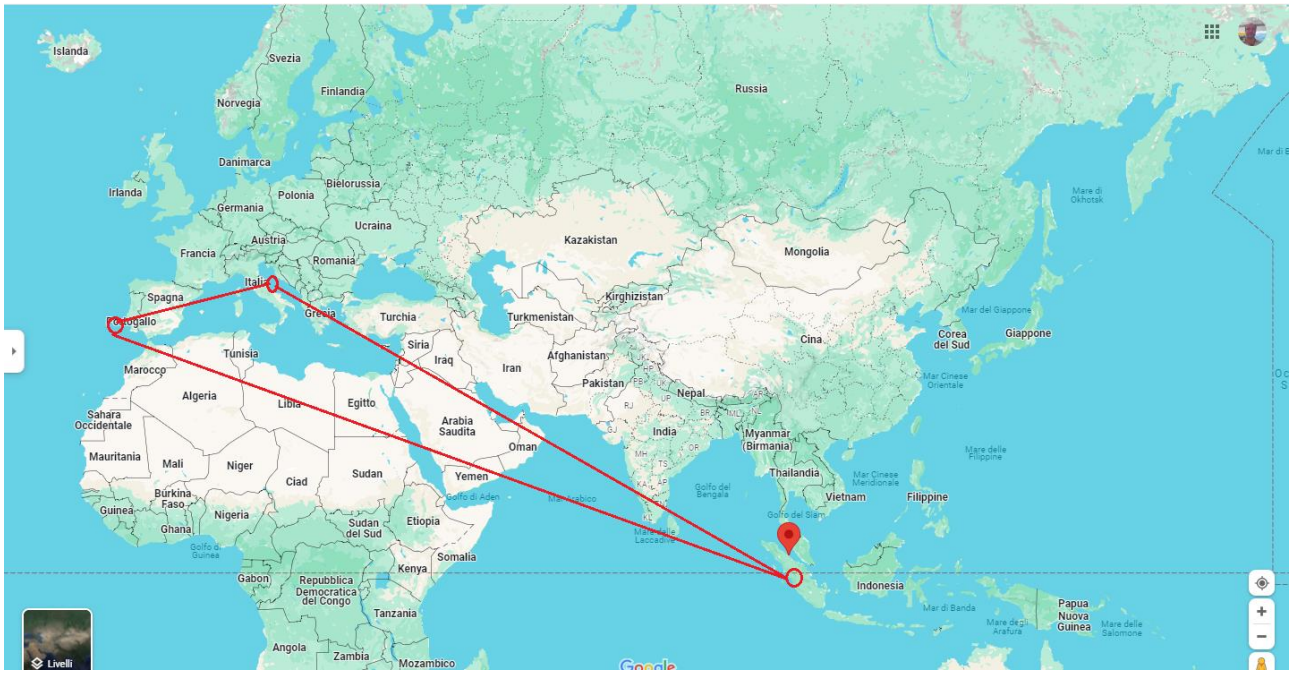
9 degrees 35.96 arcminutes

38°42'00.0"N 9°36'00.0"W North Atlantic Ocean (off Lisbon)



Lisbona – Trieste-Venezia – Indonesia

Calculated seismic radiant map



Real seismic events map

Lisbona – Trieste-Venezia-Etna – Filippine (Grablovitz’s radiant)

The 1857 Basilicata earthquake was an earthquake that occurred on December 16, 1857 in the Kingdom of the Two Sicilies, specifically in Basilicata.

Adding to that date 8 Saros cycles:

December 16, 1857 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Wednesday, December 16, 1857 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Saturday, March 16, 2002

We note that:

2002-03-10	12:39	Tirreno meridionale
2002-03-24	23:05	Etna - Versante orientale

Giovedi	14	Marzo	2002	02:02:31	Luna Nuova	23°18'44 406 707.13 km
Venerdi	22	Marzo	2002	02:28:13	Primo quarto	01°17'28 383 328.36 km
Giovedi	28	Marzo	2002	18:24:53	Luna Piena	07°53'33 357 207.65 km

Mar 16, 2002 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Saturday, March 16, 2002 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Friday, March 27, 2020

2020-03-17		Tirreno meridionale
2020-03-22	10:32	Etna - Versante orientale

16 Marzo	2020	09:34:11	Ultimo quarto	26°15'32	382 632.19 km
24 Marzo	2020	09:28:13	Luna Nuova	04°12'16	406 672.41 km

January 11, 1693

January 11, 1693 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Sunday, January 11, 1693 (Gregorian calendar) +
144 years 90 days 21 hours 36 minutes

Result

9:36 pm LMT | Tuesday, April 11, 1837

April 11-12, 1837 – Very strong earthquake in Lunigiana!!! (Fr. Giuseppe Mercalli)

Mercoledi 5 Aprile 1837 07:20:04 Luna Nuova 15°18'09 373 907.24 km

Mercoledi 12 Aprile 1837 23:13:35 Primo quarto 22°49'13 404 041.79 km

April 11, 1837 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Tuesday, April 11, 1837 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am LMT | Sunday, April 22, 1855

1-27 May 1855 – strong eruption of Vesuvius

Mercoledi 2 Maggio 1855 04:03:24 Luna Piena 11°10'22 383 497.30 km

Mercoledi 9 Maggio 1855 03:02:02 Ultimo quarto 17°54'12 369 731.90 km

Mercoledi 16 Maggio 1855 02:13:18 Luna Nuova 24°37'28 383 641.59 km

Giovedi 24 Maggio 1855 00:02:47 Primo quarto 02°13'58 403 769.17 km

Giovedi 31 Maggio 1855 14:48:04 Luna Piena 09°32'02 372 816.02 km

16/05/1855	3.05	Eclisse parziale. Magnitud. = 0,76	Settentrionale	4.49	19.23

June 3, 1781 - strong earthquake in Romagna, Marche and Tuscany

June 3, 1781 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Sunday, June 3, 1781 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Tuesday, September 1, 1925

1925-09-03	18:55	Monte Amiata
1925-09-05	07:42	Costa croata settentrionale
1925-09-10	10:33	Costa croata settentrionale

2 Settembre 1925 19:52:48 Luna Piena 09°47'49 362 835.66 km

10 Settembre 1925 00:11:26 Ultimo quarto 16°45'43 398 754.21 km

Sep 1, 1925 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Tuesday, September 1, 1925 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Sunday, September 12, 1943

The Tottori earthquake of September 10, 1943 (Japan), of magnitude 7.2, struck the Ketaka district of Tottori prefecture.

October 12, 1835 – very strong earthquake in Calabria citra

October 12, 1835 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Monday, October 12, 1835 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Thursday, January 10, 1980

1980-01-05	14:32	Torinese
1980-01-23	21	Monti Iblei
1980-01-25		Val Venosta

January 10, 1980 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Thursday, January 10, 1980 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Wednesday, January 21, 1998

1998-01-17	12:32	Golfo di Castellammare (Sicilia)
1998-01-26	23:17	Adriatico centrale

July 12, 1873 – Very strong earthquake in the Sora area (Lazio)

July 12, 1873 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Saturday, July 12, 1873 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Tuesday, October 10, 2017

2017-10-26	22:38	Vallo di Diano

July 26, 1805 – Earthquake in Terra di Lavoro and Sannio

July 26, 1805 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Friday, July 26, 1805 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Monday, October 24, 1949

21/10/1949	22.11	Eclisse parziale. Magnitud. = 0,96	Meridionale	6.29	17.20

1949-10-08	03:08	Sicilia sud-orientale
1949-10-27	19:08	Monti Reatini

October 24, 1949 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Monday, October 24, 1949 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Saturday, November 4, 1967

1967-10-31	21:08	Monti Nebrodi

August 14, 1846 - strong earthquake in Tuscany

Input interpretation

Friday, August 14, 1846 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Monday, November 12, 1990

1990-10-29	08:16	Stretto di Sicilia
1990-11-11	22:16	Slovenia occidentale

Nov 12, 1990 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Monday, November 12, 1990 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Sunday, November 23, 2008

2008-11-20	14:09	Ionio settentrionale
2008-11-28	23:39	Sicilia centrale

March 11-12, 1881 - strong earthquake in Umbria

March 12, 1881 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Saturday, March 12, 1881 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Tuesday, June 10, 2025

June 10, 2025 - 18 years 11 days 8 hours 42 minutes

Input interpretation

Tuesday, June 10, 2025 – 18 years 11 days 8 hours 42 minutes

Result

3:18 pm CEST | Tuesday, May 29, 2007

2007-05-19	16:19	Schoenwies
2007-05-25	09:39	Costa calabra settentrionale

March 5, 1823 - strong earthquake in Sicily

March 5, 1823 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Wednesday, March 5, 1823 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Saturday, June 3, 1967

1967-06-17	15:42	Gargano

Jun 3, 1967 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Saturday, June 3, 1967 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Friday, June 14, 1985

1985-06-13	21:18	Etna - Versante occidentale
1985-06-27	16:56	Stretto di Sicilia

November 1, 1755 – Lisbon Earthquake

November 1, 1755 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Saturday, November 1, 1755 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Tuesday, January 30, 1900

1900-01-29	04:22	Alanno

January 30, 1900 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Tuesday, January 30, 1900 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Sunday, February 10, 1918

1918-02-11	12:57	Appennino forlivese
1918-02-11	19:15	Appennino forlivese
1918-02-11	21:30	Appennino forlivese
1918-02-12	06:30	Appennino forlivese
1918-02-19	11:03	Costa croata settentrionale

March 28, 1787 – Mexico Earthquake – 8.6 Richter

March 28, 1787 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Wednesday, March 28, 1787 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Friday, June 26, 1931

1931-06-19		Casamicciola
1931-06-25	05:01	Senigallia

Junuary 26, 1931 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Monday, January 26, 1931 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Sunday, February 6, 1949

1949-02-03 22:29 Carnia

1 Saros cycle 18 years 11 days 8 hours 42 minutes

8 Saros cycles 144 years 90 days 21 hours 36 minutes

June 3, 1863, Manila Earthquake

June 3, 1863 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Wednesday, June 3, 1863 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Saturday, September 1, 2007

28 Agosto 2007 10:35:06 Luna Piena 04°45'34 368 615.18 km

2007-08-18	14:04	Golfo di Patti	Sicilia

1840 March 22 Philippine earthquake 6.5 R

March 22, 1840 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Sunday, March 22, 1840 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Wednesday, June 20, 1984

1984-06-17	16:51	Etna - S. Maria la Stella (Aci S.	
1984-06-19	01:27	Monti della Meta	
1984-06-19	15:19	Etna - Fiandaca (Acireale)	
1984-06-23		Sila Greca	(Calabria meridionale)

Jun 20, 1984 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Wednesday, June 20, 1984 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Monday, July 1, 2002

2002-07-08 08:12 Irpinia Mw = 4.06

What is the New Seismic Theory of the Tides by Prof. Giulio Grablovitz?

The Grablovitz Tidal-Seismic Theory has been studied in depth, and several connections between eclipse dates, Saros cycles and earthquakes have been obtained. As an example, we report the following calculation:

August 14, 1846 - strong earthquake in Tuscany.

13 Agosto 1846 22:51:27 Ultimo quarto 20°43'51 384950.14 km

21 Agosto 1846 23:25:47 Luna Nuova 28°27'21 406510.09 km

To this date, adding 8 Saros cycles, we obtain:

August 14, 1846 + 144 years 90 days 21 hours 36 minutes

Result: November 12, 1990 , date very close to the following seismic events

1990-10-29 08:16 Stretto di Sicilia

1990-11-11 22:16 Slovenia occidentale

and the following lunar phases:

2 Novembre 1990 21:48:17 Luna Piena 10°12'55 359659.75 km ;

9 Novembre 1990 13:01:47 Ultimo quarto 16°52'02 378912.90 km;

17 Novembre 1990 09:04:34 Luna Nuova 24°45'15 405502.78 km

Adding to this date 1 Saros cycle, we get:

Nov 12, 1990 + 18 years 11 days 8 hours 42 minutes

Result: November 23, 2008, date very close to the following seismic events

2008-11-20 14:09 Ionio settentrionale

2008-11-28 23:39 Sicilia centrale

and the following lunar phases:

19 Novembre 2008 21:30:43 Ultimo quarto 27°55'43 378308.53 km

27 Novembre 2008 16:54:35 Luna Nuova 05°49'28 405119.41 km

This eclipse

21/10/1949	22.11	Eclisse parziale. Magnitud. = 0,96	Meridionale	6.29	17.20

is connected to the following earthquakes:

1949-10-08	03:08	Sicilia sud-orientale
1949-10-27	19:08	Monti Reatini

7 Ottobre 1949 02:52:34 Luna Piena 13°30'25 406199.66 km

21 Ottobre 1949 21:22:47 Luna Nuova 28°08'46 357173.26 km

28 Ottobre 1949 17:04:15 Primo quarto 04°56'55 389614.11 km

To this date, adding a Saros cycle, we get: 04.11.1967, a date very close to the following earthquake:

1967-10-31	21:08	Monti Nebrodi

2 Novembre 1967 05:48:19 Luna Nuova 09°06'59 356 995.06 km

and the following eclipse:

02/11/1967	6.36	Eclisse parziale. Magnitud. = 1,01	Meridionale	6.43	17.04

05/04/1837 8.42 Eclisse parziale. Magnitud. = 0,07 Meridionale 5.47 18.40

April 11-12, 1837 – Very strong earthquake in Lunigiana!!! (Fr. Giuseppe Mercalli)

5 Aprile 1837 07:20:04 Luna Nuova 15°18'09 373907.24 km

16/05/1855	3.05	Eclisse parziale. Magnitud. = 0,76	Settentrionale	4.49	19.23

1-27 May 1855 – strong eruption of Vesuvius

16 Maggio 1855 02:13:18 Luna Nuova 24°37'28 383641.59 km

26/07/1805	7.13	Eclisse parziale. Magnitud. = 0,14	Meridionale	4.57	19.35

July 26, 1805 – Earthquake in Terra di Lavoro and Sannio

26 Luglio 1805 06:28:26 Luna Nuova 02°44'14 360 681.24 km

21/10/1949	22.11	Eclisse parziale. Magnitud. = 0,96	Meridionale	6.29	17.20

1949-10-08	03:08	Sicilia sud-orientale
1949-10-27	19:08	Monti Reatini

02/11/1967	6.36	Eclisse parziale. Magnitud. = 1,01	Meridionale	6.43	17.04

1967-10-31	21:08	Monti Nebrodi

04/03/1840	4.58	Eclisse anulare.	Settentrionale	6.41	18.04

Mercoledi 18 Marzo 1840 04:31:18 Luna Piena 27°40'43 391 673.22 km

1840 March 22 - Philippine earthquake 6.5 R

Several earthquake dates, precisely 9, are also connected with dates of partial and annular eclipses. The most interesting is that of the earthquake of July 26, 1805 in Terra di Lavoro and Sannio.

This date coincides perfectly with the eclipse of July 26, 1805. Adding 8 Saros cycles, we get October 24, 1949, a date very close to the eclipse of October 21, 1949 and to the following earthquakes: 1949-10-08 03:08 South-eastern Sicily 1949-10-27 19:08 Monti Reatini. To this date, adding a Saros cycle, we get: 11.04.1967, a date very close

to the following earthquake: 1967-10-31 21:08 Monti Nebrodi and to the following eclipse:

02/11/1967 6.36 Eclisse parziale. Magnitud. = 1,01 Meridionale 6.43 17.04

Analysis of further earthquakes

Regarding the strong earthquake of Bellunese (**PIEDMONT**) of 06.29.1873, we have the following lunar phase:

24 Giugno 1873 21:12:32 Luna Nuova 03°19'52 392 935.27 km

and the following calculations:

June 29, 1873 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Sunday, June 29, 1873 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Wednesday, September 27, 2017

2017-09-18 07:21 Etna (**SICILIA**) - Versante sud-occidentale

20 Settembre 2017 05:29:52 Luna Nuova 27°27'05 382 736.30 km

The 2017 Puebla earthquake was an earthquake that struck central **MEXICO**, specifically the states of Puebla, Morelos and the capital Mexico City. The main shock occurred on Tuesday, September 19, 2017 at 13:14:40 local time (UTC-5) with a magnitude of 7.1 Mww and lasted about 120 seconds. The epicenter was located in Morelos, about 55 km south of the city of Puebla and at a depth of 51 km

Magnitude 6.0 earthquake off the coast of **PAPUA NEW GUINEA** No tsunami warning issued Tweet September 25, 2017 A magnitude 6.0 earthquake was recorded 230 km off the coast of the New Britain region, along the coast of Papua New Guinea. The hypocenter was located at a depth of 5.7 km. This was reported by the US Geological Observatory Usgs - See more at: http://www.rainews.it/archivio-rainews/articoli/Terremoto-di-magnitudo-6-al-largo-di-Papua-Nuova-Guinea-18be0efa-a73a-4730-8c46-45d1632b9b19.html

Regarding the earthquake of 04.27.1879 and 06.22.1879 respectively in the Tuscan-Emilian Apennines and in Friuli, we note that on 07.01.1879 there was an earthquake in the Philippines of the 10th Mercalli and that adding 8 Saros cycles to the date of 06.22.1879, we have:

Moon Phases April 1879

21 Aprile	1879	13:55:41	Luna Nuova	01°04'38	406673.04 km
29 Aprile	1879	14:16:33	Primo quarto	08°52'28	383731.80 km
3 Luglio	1879	21:38:03	Luna Piena	11°30'59	369165.43 km

19/07/1879	10.01	Eclisse anulare.	Meridionale	4.51	19.41

FRIULI

June 22, 1879 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Sunday, June 22, 1879 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Wednesday, September 20, 2023

The 2023 Marrakesh-Safi earthquake was a seismic event that occurred on the night of September 8, 2023, that struck the Marrakesh-Safi region of Morocco along the Atlas mountain range

MOROCCO

Two strong earthquakes were recorded today, September 8, 2023, on the coast of the western state of Jalisco, in **MEXICO**. According to USGS data, a first shock of magnitude 5.6 occurred at 9:53 local time (17:53 in Italy) with an epicenter 9 km northwest of Emiliano Zapata, very close to the coast, and at a depth of 35 km. The epicenter of the second shock of magnitude 5.8, which occurred at 18:37 Italian time,

was located 4 km northeast of Emiliano Zapata, while the hypocenter was located at a depth of 54 km.

15 Settembre 2023 01:39:48 Luna Nuova 21°58'42 404203.97 km

Tuesday 12 September 2023, 21:39 - Last update 13 September, 16:17

A violent earthquake of magnitude 6.3 was recorded at sea about seventy kilometers north of the northern island of Luzon, in the **PHILIPPINES**, by the global service of the Usgs, the US geoseismic institute.

Earthquake in Slovenia felt in Friuli: five tremors in a few minutes, the strongest of magnitude 3.6

19 sept 2023 — Earthquake of magnitude ML 2.1 on September 19, 2023 at 16:06:50 (Italy Time Zone) in the area: **SOUTHERN TYRRHENIAN SEA** (SEA)

29 Settembre 2023 09:57:32 Luna Piena 06°00'24 361553.82 km

On **Thursday 28 September 2023** at 00:49 an earthquake of magnitude 3.2 and depth 454.4 km was recorded in **TIRRENO MERIDIONALE** (MARE). Further information on the INGV page by clicking here.

Regarding the other date (**TUSCAN-EMILIAN APENNINES**), adding 8 Saros cycles, we obtain:

April 27, 1879 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Sunday, April 27, 1879 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Wednesday, July 26, 2023

An earthquake of magnitude ML 4.3 was recorded by the stations of the National Seismic Network at 19:34 Italian time today, July 29, 2023. The epicenter was located on the border between **SLOVENIA** and **CROATIA**, 48 km from San Dorligo della Valle-Dolina (TS), 55 km from Muggia (TS), 56 km from Trieste (TS), with a hypocenter at a depth of about 5 km.

An earthquake of magnitude 6.4 was recorded in **MEXICO**, with epicenter on the coast of Chiapas on 07.14.2023

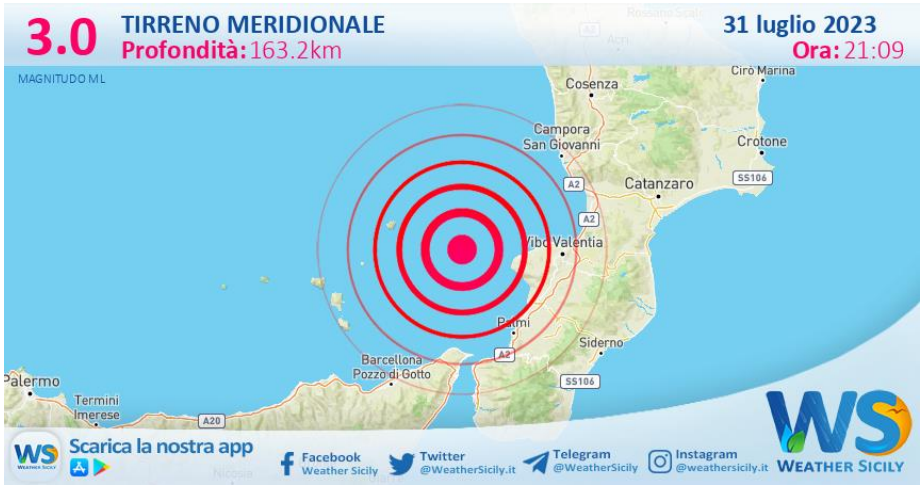
17 Luglio 2023 18:31:50 Luna Nuova 24°56'09 403 968.54 km

Earthquake with magnitude 4.4 felt at 19:26 on July 24, 2023.

Location: Mindanao, **PHILIPPINES.**

25 Luglio 2023 22:06:47 Primo quarto 02°43'00 391099.20 km

1 Agosto 2023 18:31:40 Luna Piena 09°15'48 357528.34 km



31.07.2023 Strong earthquake in the **SOUTHERN TYRRHENIAN SEA**

The 1873 San Ginesio earthquake, cited in scientific literature as the **SOUTHERN MARCHE** earthquake, was an earthquake that occurred on 12 March 1873 in the Morello di San Ginesio area, in the province of Macerata.

14 Marzo 1873 05:44:38 Luna Piena 23°44'34 403 114.74 km

Adding 8 Saros cycles to that date, we get:

March 12, 1873 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Wednesday, March 12, 1873 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Saturday, June 10, 2017

Earthquake today/ Ingv, latest tremors: 2.6M earthquake in the **SOUTHERN TYRRHENIAN SEA** (June 5, 2017, 9:00 am). Earthquake today, latest tremor

yesterday in the world: 3.2M earthquake in Chile. Temperatures falling and bad weather in most of Italy due to a temporary disturbance

2017-06-09 12:15 Aquilano (**ABRUZZO**)

A few minutes into this new day, Sunday 18 June 2017, international seismographs located a major earthquake that hit the **FIJI ISLANDS**. The power of the earthquake was 5.4M, detected at 00.26 and at latitude 24.05 and longitude 179.52, hypocentre at a depth of 519 km. At 23.27, **INDONESIA** was hit by an earthquake of 4.2M, located south of Sumatra, at latitude 3.17 and longitude 101.20. The hypocentre was detected at a depth of 17 km. The situation is calm in Italy, where the last shock, equal to 2.2M, was detected at 22.53 in the province of Rieti. The National Earthquake Center has identified the epicenter at latitude 42.60 and longitude 13.22, hypocenter at a depth of 11 km. Involved Cittareale, Amatrice, Montereale, Accumoli, Capitignano, Borbona, Posta, Campotosto, Cagnano Amiterno, Barete and Pizzoli.

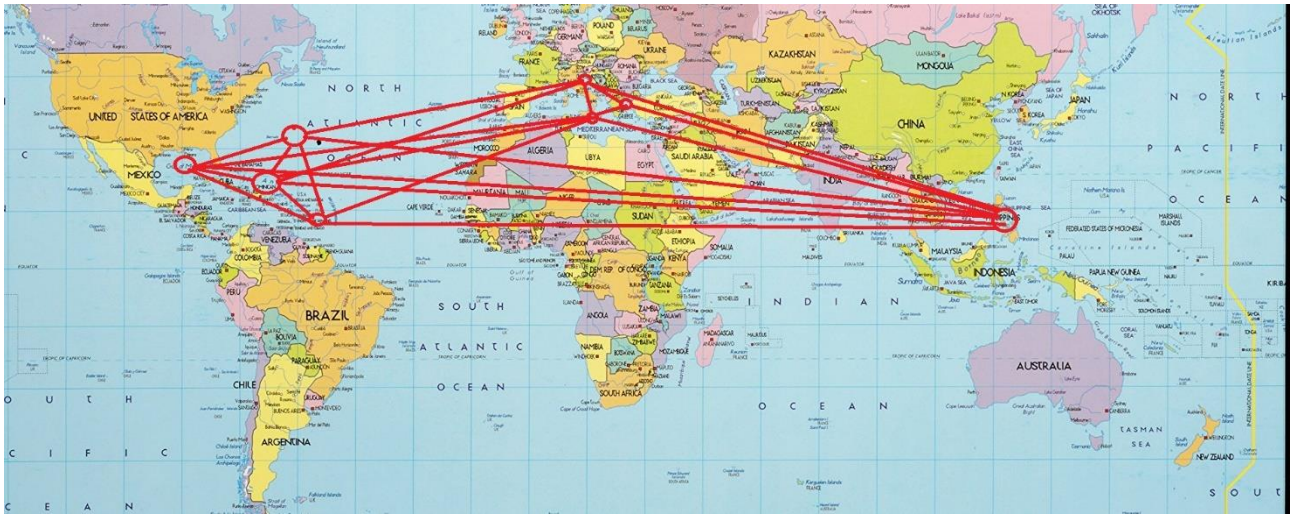
An earthquake measuring 6.9 on the Richter scale was recorded yesterday, Wednesday 14 June 2017, with epicenter in the region of San Marcos, west of **GUATEMALA**, near the border with the Mexican state of Chiapas.

Earthquake in Guatemala Photo: Russia Today

The United States Geological Survey (USGS) reported that an earthquake measuring 6.9 on the Richter scale was recorded yesterday, Wednesday 14, with its epicenter in the region of San Marcos, west of Guatemala, near the border with the Mexican state of Chiapas.

The epicenter of the earthquake was located three kilometers from the town of San Pablo, Guatemala, and the hypocenter at a depth of 98 kilometers, the multi-state chain Telesur reported.

1 Giugno	2017	12:42:07	Primo quarto	11°12'47	385 120.37 km
9 Giugno	2017	13:09:35	Luna Piena	18°53'15	406 271.65 km
17 Giugno	2017	11:32:43	Ultimo quarto	26°27'56	381 487.31 km
24 Giugno	2017	02:30:42	Luna Nuova	02°47'18	358 341.17 km



Seismic radians as per the Mareo-seismic theory of Giulio Grablovitz (Fig. 1)

Antille – Golfo del Messico-Santa Lucia – Mar dei Sargassi - Lisbona – Trieste-Venezia-Etna – Grecia (Eubea) - Filippine

Seismic radians as per the Mareo-seismic Theory of Giulio Grablovitz (Updated to September 1, 2024, by Nardelli Prof. Michele) (Fig. 3)

Messico-Guatemala; Marocco-Italia; Filippine-Indonesia-Papua Nuova Guinea-Fiji

Earthquakes in the world 08.17.2024

5.0 551.4 Km Suva (Fiji) -23.1385 179.3199 17-08-2024 23:50

5.0 336.5 Km Tiakur (Indonesia) -6.6547 128.0267 17-08-2024 23:10

5.0 320.0 Km Tiakur (Indonesia) -6.6800 128.0400 17-08-2024 22:52

5.1 35.0 Km Petropavlovsk-Kamchatsky 52.9896 160.1884 17-08-2024 22:24

5.1 30.0 Km Petropavlovsk-Kamchatsky 52.9000 160.0800 17-08-2024 21:40

7.0 29.0 Km Petropavlovsk-Kamchatsky 52.7320 160.0850 17-08-2024 21:23

5.9 30.0 Km Petropavlovsk-Kamchatsky 52.8700 160.2100 17-08-2024 21:10

4.0 17.0 Km Ákra Agías Pelagías (Grecia) 37.7500 19.9200 17-08-2024 20:32

4.7 10.0 Km Yilan (Taiwan) 24.3741 121.9141 17-08-2024 15:52

4.6 213.6 Km Kimbe (Papua-Nuova Guinea) -5.0721 150.6495 17-08-2024 14:14

5.2 614.6 Km Levuka (Fiji) -20.8979 -179.1374 17-08-2024 13:54

4.3 234.0 Km Kimbe (Papua-Nuova Guinea) -5.0900 150.7200 17-08-2024 13:22

4.6 39.1 Km Vintar (Filippine) 18.3844 120.7571 17-08-2024 12:53

5.2 10.0 Km Hachijojima Airport (Giappone) 32.4651 142.3967 17-08-2024 08:51

4.3 62.0 Km Napier (Nuova Zelanda) -39.1900 176.5100 17-08-2024 06:52

5.7 113.0 Km Nuku‘alofa (Tonga) -21.8523 -176.2293 17-08-2024 05:51

5.3 140.0 Km 'Ohonua (Tonga) -21.8900 -175.4200 17-08-2024 05:29

5.2 169.1 Km Yelizovo (Russia) 53.5272 158.2732 17-08-2024 04:22

5.2 168.0 Km Yelizovo (Russia) 53.5400 158.1900 17-08-2024 04:00

4.2 9.0 Km Saumlaki (Indonesia) -7.0100 129.8700 17-08-2024 02:55

4.8 53.0 Km Onagawa Ch? (Giappone) 38.5728 141.8918 17-08-2024 02:50

4.9 52.0 Km Onagawa Ch? (Giappone) 38.4700 142.0200 17-08-2024 02:33

4.9 35.0 Km Claveria (Filippine) 19.2633 121.1679 17-08-2024 02:25

4.4 9.0 Km Claveria (Filippine) 19.0100 121.4200 17-08-2024 01:56

Earthquakes in Italy 08.17.2024

2024-08-17 23:33:32	Md 2.6	Campi Flegrei
2024-08-17 22:02:28	ML 2.0	4 km SE Montalbano Elicona (ME)
2024-08-17 21:10:27	**Mwp 7.0**	**Off east coast of Kamchatka Peninsula, Russia [Sea: Russia]**
2024-08-17 19:18:35	ML 2.4	Tirreno Meridionale (MARE)
2024-08-17 16:15:11	Md 2.0	Campi Flegrei
2024-08-17 14:52:44	Md 2.3	Campi Flegrei
2024-08-17 05:23:00	ML 2.1	3 km S Calice al Cornoviglio (SP)

2024-08-17 02:43:42	ML 2.5	4 km SE Calice al Cornoviglio (SP)
2024-08-17 00:18:45	ML 2.5	Canale di Sicilia meridionale (MARE)

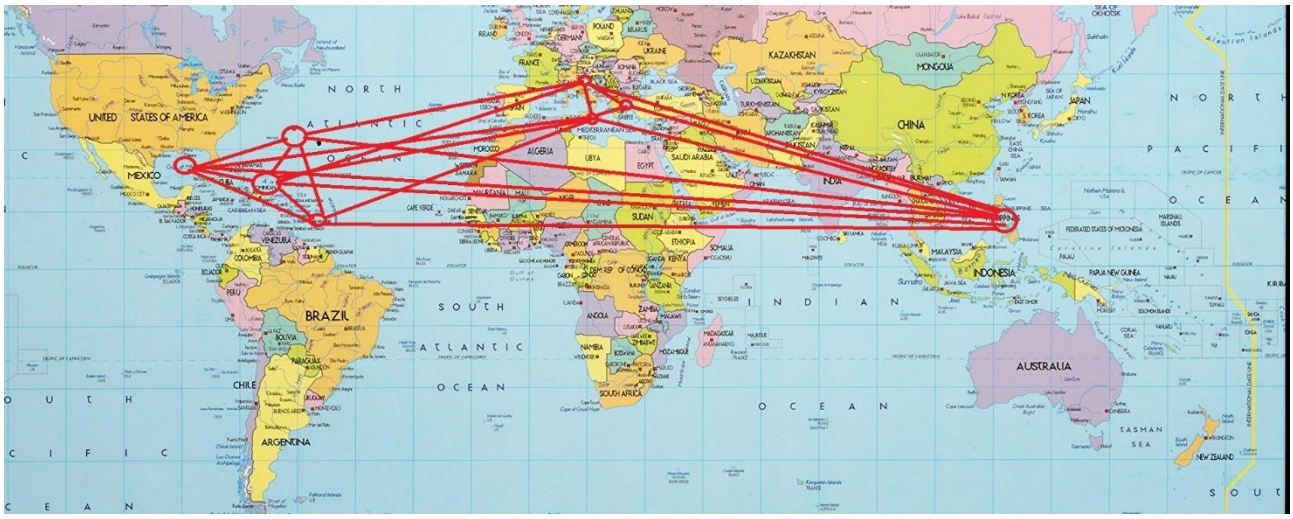
August 17 01:24 Earthquake in Mexico

On August 17, 2024, seismic events occurred in the following locations:

Filippine-Giappone-Indonesia-Kamčatka (Russia)-Oceania (Fiji, Tonga)-Nuova Zelanda-Giappone-Filippine-Papua Nuova Guinea-Oceania-Papua Nuova Guinea-Taiwan-Messico-Grecia- Kamčatka (Russia)-Indonesia-Oceania (Fiji, Tonga)

Canale di Sicilia Meridionale-Calice al Cornoviglio (La Spezia)-Campi Flegrei-Tirreno Meridionale (in mare, tra la Calabria e le isole Eolie)-Montalbano Elicona (Messina)-Campi Flegrei

Seismic events map August 17, 2024 (Fig. 3)



(Fig. 1 compared with Fig. 3)

The four fundamental “Radians” of the Mareo-seismic Theory of Prof. Giulio Grablovitz

The “tour” of earthquakes was:

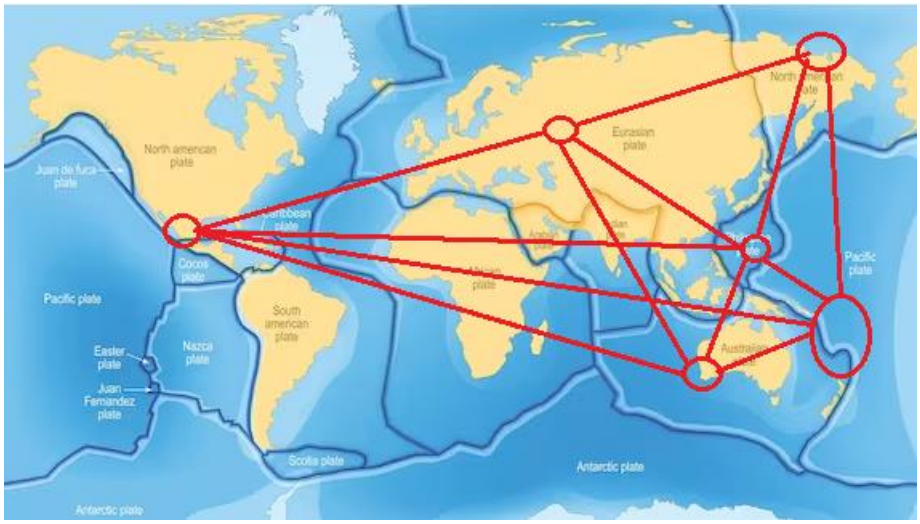
Sicilia meridionale – Messico - Filippine – Giappone - Liguria – Indonesia - Kamčatka (Russia)- Liguria – Oceania – Nuova Zelanda – Giappone – Filippine – P. Nuova Guinea – Oceania – P. Nuova Guinea – Campi Flegrei – Taiwan – Campi Flegrei - Tirreno Meridionale - Grecia - Kamčatka (Russia)- Sicilia - Kamčatka (Russia)- Indonesia – Campi Flegrei - Oceania

That is to say:

Italia –Messico - Filippine – Giappone - Italia – Indonesia - Kamčatka (Russia)- Italia – Oceania – Nuova Zelanda – Giappone – Filippine – P. Nuova Guinea – Oceania – P. Nuova Guinea – Italia – Taiwan – Italia - Grecia - Kamčatka (Russia)- Italia - Kamčatka (Russia)- Indonesia – Italia - Oceania

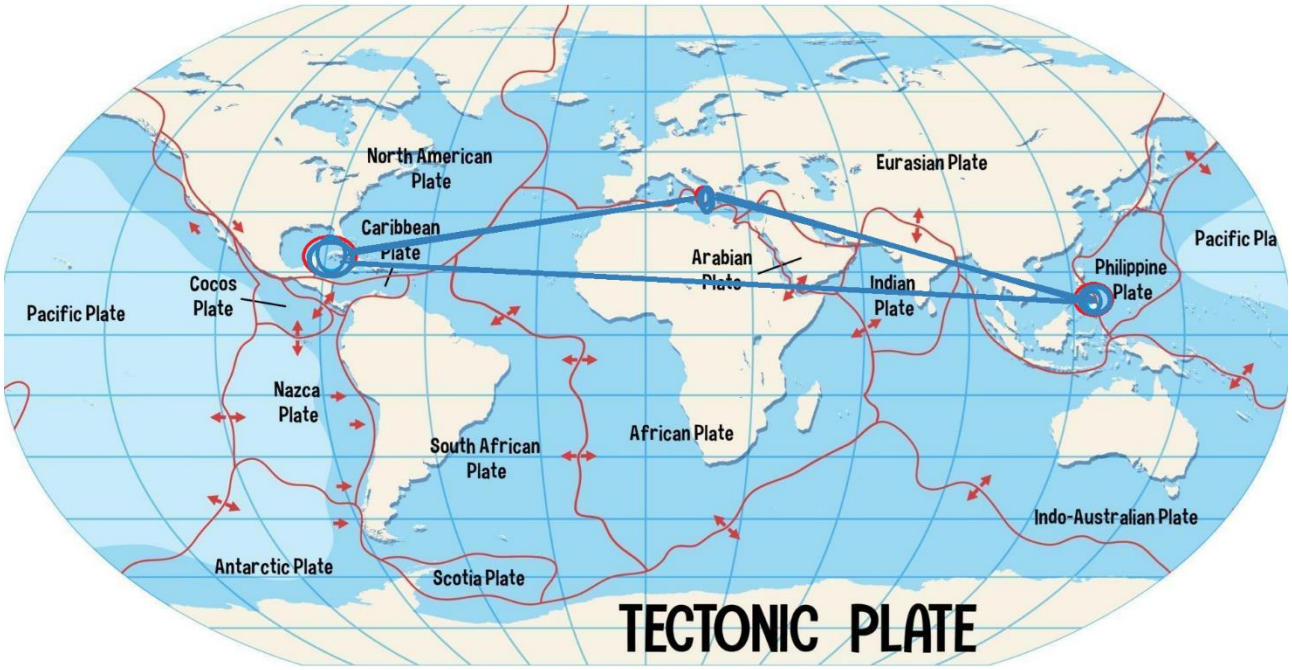
As far as the plates are concerned, there was the following “round”:

Placca euroasiatica – (Placca nord-americana – Placca di Cocos – Placca caraibica) – Placca Filippine - Placca euroasiatica – Placca nord-americana - Placca euroasiatica – Placca australiana – Placca pacifica - Placca euroasiatica - Placca Filippine - Placca australiana - Placca pacifica - Placca euroasiatica - Placca nord-americana - Placca euroasiatica - Placca nord-americana - Placca euroasiatica - Placca australiana - Placca pacifica



The rotation of the continental plates was, regarding the earthquakes that occurred on August 17, 2024, as follows

Placca euroasiatica – (Placca nord-americana – Placca di Cocos – Placca caraibica) – Placca Filippine – Placca australiana – Placca pacifica



Fundamental **seismic radians** of the Tidal-Seismic Theory of Prof. Giulio Grablovitz. The figure also highlights the plates on which the aforementioned **seismic radians** "rest"

MAREA DELLE ANTILLE

Località	Ore	Osservazioni
AFRICA		
Isola del Nord (presso Sherboro)	5ʰ 56′	Sotto la parziale influenza della marea *oceanica*.
Capo della Sierra Leone	7 46	
Riviera di Ponga	7 24	
„ „ Nunez	10 —	
Gambia	8 —	
Isola Factory	*6 55	Le ore segnate con asterisco si riferiscono generalmente ad isole e sono perciò in anticipazione rispetto alle coste vicine, a misura della rispettiva distanza dal punto radiante.
„ Gorea	*7 46	
Capo Verde	7 40	
Isola Santiago	*6 —	
„ S. Nicolao	*7 —	
Senegal	(5 12)	Le ore tra parentesi si riferiscono a località non esposte al mare aperto, per cui non sono atte a dar norma esatta.
Capo Bianco	10 40	
Riviera d'Ouro	12 —	
Capo Bojador	12 14	
Mogador	13 20	
Isola Madera (Funchal)	*13 —	
„ Fayal (Azzorre)	*12 —	Il salto di circa 12 ore corrisponde a mezza giornata lunare.
Ceuta (nel Mediterraneo)	(2 19)	

Let's add up the various hours:

5.56hours + 7.46hours + 7.24hours + 10hours + 8hours + 6.55hours + 7.46hours + 7.40hours + 6hours

Result

65.67 hours

Unit conversions

2 days 17 hours 40 minutes

---

65 hours 40 minutes

236 400 seconds

3940 minutes

2.736 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

7.087×10^{10} km (kilometers)

7.087×10^{13} meters

474 au (astronomical units)

44.04 billion miles

Frequency ν from $\nu = 1/T$:

4.2×10^{-6} Hz (hertz)

(65.67 hours+7hours + 5.12hours + 10.40hours + 12hours + 12.14hours + 13.20hours + 13hours + 12hours + 2.19hours)

Input interpretation

65.67 hours + 7 hours + 5.12 hours + 10.4 hours + 12 hours +
12.14 hours + 13.2 hours + 13 hours + 12 hours + 2.19 hours

Result

152.72 hours

Unit conversions

6 days 8 hours 43 minutes 12 seconds

---

152 hours 43 minutes 12 seconds

---

549 790 seconds

9163 minutes

6.3633 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.648×10^{11} km (kilometers)

1.648×10^{14} meters

1102 au (astronomical units)

102.4 billion miles

Frequency ν from $\nu = 1/T$:

1.8×10^{-6} Hz (hertz)

From which:

(152.72)^1/10

Input interpretation

$\sqrt[10]{152.72}$

Result

1.653444384639451566045367295803198043433963013319298026646578519 5

…

1.653444384…. result very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164.2696$ i.e. 1.6557845...

11(152.72)+7^2

Input interpretation

$11 \times 152.72 + 7^2$

Result

1728.92

1728.92

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string.

This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(11(152.72)+7^2)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\sqrt[15]{11\times 152.72+7^2}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.64493295345133589110349853129647152452816975845379567195851325 37
…

1.64493295345…. ≈ $\zeta(2) = \pi^2/6 = 1.644934$ (trace of the instanton shape and Ramanujan Recurring Number)

(1/27(((11(152.72)+7^2)-1)))^2+1/Pi

Input interpretation

$$\left(\frac{1}{27}\left(\left(11\times 152.72+7^2\right)-1\right)\right)^2+\frac{1}{\pi}$$

Result

4095.94…

4095.94…. ≈ 4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry.

Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternative representations

$$\left(\frac{1}{27}\left((11\times 152.72+7^2)-1\right)\right)^2+\frac{1}{\pi}=\frac{1}{180^\circ}+\left(\frac{1}{27}\left(1678.92+7^2\right)\right)^2$$

$$\left(\frac{1}{27}\left((11\times 152.72+7^2)-1\right)\right)^2+\frac{1}{\pi}=-\frac{1}{i\log(-1)}+\left(\frac{1}{27}\left(1678.92+7^2\right)\right)^2$$

$$\left(\frac{1}{27}\left((11\times 152.72+7^2)-1\right)\right)^2+\frac{1}{\pi}=\frac{1}{\cos^{-1}(-1)}+\left(\frac{1}{27}\left(1678.92+7^2\right)\right)^2$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\left(\frac{1}{27}\left((11\times 152.72+7^2)-1\right)\right)^2+\frac{1}{\pi}=4095.62+\frac{1}{4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\left(\frac{1}{27}\left((11\times 152.72+7^2)-1\right)\right)^2+\frac{1}{\pi}=4095.62+\frac{1}{-2+2\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\left(\frac{1}{27}\left(\left(11\times 152.72+7^2\right)-1\right)\right)^2+\frac{1}{\pi}=4095.62+\frac{1}{\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50\,k)}{\binom{3\,k}{k}}}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\left(\frac{1}{27}\left(\left(11\times 152.72+7^2\right)-1\right)\right)^2+\frac{1}{\pi}=4095.62+\frac{1}{2\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\left(\frac{1}{27}\left(\left(11\times 152.72+7^2\right)-1\right)\right)^2+\frac{1}{\pi}=4095.62+\frac{1}{4\int_0^1\sqrt{1-t^2}\,dt}$$

$$\left(\frac{1}{27}\left(\left(11\times 152.72+7^2\right)-1\right)\right)^2+\frac{1}{\pi}=4095.62+\frac{1}{2\int_0^{\infty}\frac{\sin(t)}{t}\,dt}$$

EUROPA

Costa occidentale iberica.

Algesiras (Mediterraneo)	(2ʰ 3′)
Cadice	1 26
Porto della Caraca	1 38
Pera-Algarve	1 56
Baia di Lagos	2 26
Sines	2 21
Cascaes (Tago)	1 46
Paço d'Arcos	2 16
Lisbona (arsenale)	(2 46)
Peniche	2 26
Oporto	2 46
Camarinas	2 46

(2.3 hours+1.26hours + 1.38hours + 1.56hours + 2.26hours + 2.21hours + 1.46hours + 2.16hours + 2.46hours + 2.26hours + 2.46hours + 2.46hours)

Input interpretation

2.3 hours + 1.26 hours + 1.38 hours + 1.56 hours + 2.26 hours + 2.21 hours + 1.46 hours + 2.16 hours + 2.46 hours + 2.26 hours + 2.46 hours + 2.46 hours

Result

24.23 hours

Unit conversions

1 day 13 minutes 50 seconds

---

24 hours 13 minutes 50 seconds

87 200 seconds

1454 minutes

1.01 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

2.615×10^{10} km (kilometers)

2.615×10^{13} meters

175 au (astronomical units)

16.25 billion miles

Frequency ν from $\nu = 1/T$:

1.1×10^{-5} Hz (hertz)

Costa iberica settentrionale.

Ferrol	2	56
Santander	3	46
Bilbao	3	16
San Sebastiano	3	26

24.23 hours + 2.56hours + 3.46hours + 3.16hours + 3.26hours

Input interpretation

24.23 hours + 2.56 hours + 3.46 hours + 3.16 hours + 3.26 hours

Result

36.67 hours

Unit conversions

1 day 12 hours 40 minutes

---

36 hours 40 minutes

---

132 010 seconds

2200 minutes

1.528 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

3.958×10^{10} km (kilometers)

3.958×10^{13} meters

265 au (astronomical units)

24.59 billion miles

Frequency ν from $\nu = 1/T$:

7.6×10^{-6} Hz (hertz)

From which:

121(36.67)-322-11-8

Input

$121 \times 36.67 - 322 - 11 - 8$

Result

4096.07

4096.07 ≈ 4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson.

This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

27*sqrt(121(36.67)-322-11-8)+1

Input

$$27\sqrt{121\times 36.67-322-11-8}+1$$

Result

1729.01…

1729.01….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron.

As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

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(27*sqrt(121(36.67)-322-11-8)+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{27\sqrt{121\times 36.67-322-11-8}+1}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.64493895999911727052390410304730498468482307719020382190709186 00
...

1.644938959…. ≈ $\zeta(2) = \pi^2/6 = 1.644934$ (trace of the instanton shape and Ramanujan Recurring Number)

Costa francese occidentale.

Località	Ore	Altezze
Boucaut (Adour)	3h 53'	M. 1.40
Cordouan (Gironda)	3 53	„ 2.35
La Rochelle	3 31	„ 2.67
S. Nazaire (Loira)	3 47	„ 2.68
Le Croisic.	3 42	„ 2.50
Port Louis (Lorient)	3 24	„ 2.35
Lorient	3 32	„ 2.24
Audierne	3 31	„ 2.—
Brest	3 46	„ 3.21

(3.53h + 3.53h + 3.31h + 3.47h + 3.42h + 3.24h + 3.32h + 3.31h + 3.46h)

Input interpretation

3.53 hours + 3.53 hours + 3.31 hours + 3.47 hours +
3.42 hours + 3.24 hours + 3.32 hours + 3.31 hours + 3.46 hours

Result

30.59 hours

Unit conversions

1 day 6 hours 35 minutes 24 seconds

---

30 hours 35 minutes 24 seconds

---

110 100 seconds

1835 minutes

1.275 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

- 3.301×10^{10} km (kilometers)
- 3.301×10^{13} meters
- 221 au (astronomical units)
- 20.51 billion miles

Frequency ν from $\nu = 1/T$:

- 9.1×10^{-6} Hz (hertz)

Costa francese settentrionale.

Morlaix	5 15	„	?
S. Malò	6 10	„	5.68
Jersey (isola)	6 25	„	?
Guernesey (isola)	6 28	„	?
Granville	6 23	„	6.15
Cherbourg	7 58	„	2.82
Barfleur	8 55	„	2.82
La Hougue	8 48	„	3.04
Port en Bessin	9 8	„	3.20
Entrée de l'Orne	9 8	„	3.65

(5.15hours+6.10hours+6.25hours+6.28hours+6.23hours+7.58hours+8.55hours+8.48hours+9.8hours+9.8hours)

Input interpretation

5.15 hours + 6.1 hours + 6.25 hours + 6.28 hours + 6.23 hours +
7.58 hours + 8.55 hours + 8.48 hours + 9.8 hours + 9.8 hours

Result

74.2 hours

Unit conversions

3 days 2 hours 13 minutes

---

267 200 seconds

4450 minutes

3.09 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

8.01×10^{10} km (kilometers)

8.01×10^{13} meters

535 au (astronomical units)

49.77 billion miles

Frequency ν from $\nu = 1/T$:

3.7×10^{-6} Hz (hertz)

We obtain:

(30.59hours+74.2 hours)

Input interpretation

30.59 hours + 74.2 hours

Result

104.79 hours

Unit conversions

4 days 8 hours 47 minutes 24 seconds

104 hours 47 minutes 24 seconds

377 200 seconds

6287 minutes

4.366 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.131×10^{11} km (kilometers)

1.131×10^{14} meters

756 au (astronomical units)

70.27 billion miles

Frequency ν from $\nu = 1/T$:

2.7×10^{-6} Hz (hertz)

From which:

(17(30.59+74.2)-55+3)-2/5

Input

$$(17\,(30.59 + 74.2) - 55 + 3) - \frac{2}{5}$$

Result

1729.03

1729.03

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

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(1/27(((17(30.59+74.2)-55+3)-2/5)-1))^2-4/5*MRB const

Input

$$\left(\frac{1}{27}\left(\left((17\,(30.59+74.2)-55+3)-\frac{2}{5}\right)-1\right)\right)^2-\frac{4}{5}\,C_{\text{MRB}}$$

C_{MRB} is the MRB constant

Result

4095.99…

4095.99…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson.

This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

((17(30.59+74.2)-55+3)-2/5)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{(17\,(30.59+74.2)-55+3)-\frac{2}{5}}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.64493992557840213508637671641473944406689492743583102820263177 83

…

1.6449399255784…. ≈ $\zeta(2) = \pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Honfleur	9h	30′	M.	?
Le Hâvre de Grace	9	18	„	3.57
Fécamp	10	44	„	3.86
Dieppe	11	8	„	4.40
Cayeux (Somme)	11	13	„	4.58
Boulogne	11	26	„	3.96
Calais	11	49	„	3.12
Dunkerque	12	13	„	2.68

(9.15 hours + 10.44 hours + 11.8 hours + 11.13 hours + 11.26 hours + 11.49 hours + 12.13 hours)

Input interpretation

9.15 hours + 10.44 hours + 11.8 hours +
11.13 hours + 11.26 hours + 11.49 hours + 12.13 hours

Result

77.4 hours

Unit conversions

3 days 5 hours 24 minutes

---

77 hours 24 minutes

---

278 640 seconds

4644 minutes

3.225 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

8.353×10^{10} km (kilometers)

8.353×10^{13} meters

558 au (astronomical units)

51.91 billion miles

Frequency ν from $\nu = 1/T$:

3.6×10^{-6} Hz (hertz)

From which:

1/47((77.4)-√2)

Input

$$\frac{1}{47}\left(77.4 - \sqrt{2}\right)$$

Result

1.616718860375040530876559814378517062158092087757937275038794048 1

…

1.616718860375…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

AMERICA SETTENTRIONALE

Mare delle Antille

La Trinità	4h 26′
S. Lucia	6 40
Porto Rico (S. Giovanni)	8 16
Capo Haiti	6 —
Is. Thompson	10 23

Oceano Atlantico

Le Bermude	7 14
S. Agostino	8 34
Savannah	8 39
Charlestown	7 50
Capo Fear	7 44
„ Hatteras	6 13
Gosport	9 30
Delaware Breakwater	8h 5′
Sandy Hook	8 5
Old Point Comfort	8 57
New York	9 —
Newport	8 10
Warren	8 35
Gardiner's Bay	10 25
Nautucket	13 —
Cap Cod	12 —
Province Town	12 —
Boston	11 40
Glouchester	12 29
Portsmouth	12 —
Portland	11 40
Ile Mount Desert	11 40
Portmaine	11 43
S. Pietro e Miquelon	8 35

(4.26hours + 6.40hours + 8.16hours +6hours+10.23hours)

Input interpretation

4.26 hours + 6.4 hours + 8.16 hours + 6 hours + 10.23 hours

Result

35.05 hours

Unit conversions

1 day 11 hours 3 minutes

---

35 hours 3 minutes

---

126 180 seconds

2103 minutes

1.46 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

3.783×10^{10} km (kilometers)

3.783×10^{13} meters

253 au (astronomical units)

23.51 billion miles

Frequency ν from $\nu = 1/T$:

7.9×10^{-6} Hz (hertz)

(7.14hours+8.34hours+8.39hours+7.50hours+7.44hours+6.13hours+9.30hours+8.5hours+8.5hours+8.57hours+9hours+8.10hours+8.35hours)

Input interpretation

7.14 hours + 8.34 hours + 8.39 hours + 7.5 hours + 7.44 hours + 6.13 hours +
9.3 hours + 8.5 hours + 8.5 hours + 8.57 hours + 9 hours + 8.1 hours + 8.35 hours

Result

105.3 hours

Gardiner's Bay	10	25
Nautucket	13	—
Cap Cod	12	—
Province Town	12	—
Boston	11	40
Glouchester	12	29
Portsmouth	12	—
Portland	11	40
Ile Mount Desert	11	40
Portmaine	11	43
S. Pietro e Miquelon	8	35

(10.25hours+13hours+12hours+12hours+11.40hours+12.29hours+12hours+11.40hours+11.40hours+11.43hours+8.35hours)

Input interpretation

10.25 hours + 13 hours + 12 hours + 12 hours + 11.4 hours + 12.29 hours + 12 hours + 11.4 hours + 11.4 hours + 11.43 hours + 8.35 hours

Result

125.52 hours

We obtain, thus:

(35.05hours+105.3hours+125.52 hours)

Input interpretation

35.05 hours + 105.3 hours + 125.52 hours

Result

265.9 hours

Unit conversions

11 days 1 hour 50 minutes

---

265 hours 50 minutes

---

957 100 seconds

---

15 952 minutes

11.08 days

Interpretations

time

half-life

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

2.869×10^{11} km (kilometers)

2.869×10^{14} meters

1918 au (astronomical units)

178.3 billion miles

Frequency ν from $\nu = 1/T$:

1×10^{-6} Hz (hertz)

From which, after some calculations:

108*sqrt(35.05+105.3+125.52)-2^5

Input interpretation

$108\sqrt{35.05 + 105.3 + 125.52} - 2^5$

Result

1729.00…

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

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(108*sqrt(35.05+105.3+125.52)-2^5)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\sqrt[15]{108\sqrt{35.05+105.3+125.52}-2^5}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.64493778442225932234097483050244990823025816673211544302344854 56

…

1.6449377844…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

(1/27((108*sqrt(35.05+105.3+125.52)-2^5)-1))^2

Input interpretation

$$\left(\frac{1}{27}\left(\left(108\sqrt{35.05+105.3+125.52}-2^5\right)-1\right)\right)^2$$

Result

4095.98…

4095.98…. ≈ 4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

MAREA DELLE FILIPPINE

ASIA

Coste orientali.

Sbocco del Cambodge .	12h 16'	Isole Bonin	6h 24'
Macao	9 44	Porto Lloyd	7 15
Isole Lieu Chieu . . .	6 10	S. Pietro e Paolo . . .	3 30
		Is. Karaguinsky . . .	3 50
		Baja S. Croce	9 58
		„ S. Lorenzo . . .	6 50

(12.16hours + 9.44hours + 6.10hours + 6.24hours + 7.15hours + 3.30hours +3.50hours +9.58hours +6.50hours)

Input interpretation

12.16 hours + 9.44 hours + 6.1 hours + 6.24 hours +
7.15 hours + 3.3 hours + 3.5 hours + 9.58 hours + 6.5 hours

Result

63.97 hours

AMERICA

Coste orientali

Addottata l'ipotesi dell'influenza diretta d'una marea proveniente dalle Filippine, secondo la corrente equatoriale contraria, prendo come punto di scissione le Isole Galapagos:

Isola Charles . . . . 3h 20'

AMERICA SETTENTRIONALE

Acapulco	3h 00'
San Blas	9 47
Mazatlan	9 40
Baja Maddalena	(7 40)
Monterey	10 —
P. S. Francisco	10 50
Porto Bodega	11 50
Riviera Columbia	12 30
Baia di Nootka	12 50
Sitka	12 50
Isola Kodiack	12 45
Baja Nuciaga	12 50
Forte Nicolaewsky	16 —

ISOLE ALEUTINE

S. Paolo	16 —
Atka	12 20
Attu	12 50

AMERICA MERIDIONALE

Payta	3h 20'
Callao de Lima	6 —
Coquimbo	9 30
Valparaiso	9 30
Bisbao	10 50
Valdivia	11 50
S. Carlos de Chiloè	12 7
Christmas Sound	2 30

(col salto di mezza giornata lunare)

ISOLE MALUINE

S. Stefano	7h 56'
Albemarle	7 40

PATAGONIA

Coste orientali

Capo Vergini	7 56
Riviera Gallegos	8 26
Santa Cruz	10 20
Porto S. Giuliano	10 30
„ Désiré	13 14

Marea riflessa

NB. Abbiasi riguardo alla differenza di meridiano, la quale è assai sensibile anche su queste coste.

(3.20hours + 3hours + 9.47hours + 9.40hours + 7.40hours + 10hours + 10.50hours + 11.50hours + 12.30hours + 12.50hours + 12.50hours +12.45hours + 12.50hours + 16hours)

Input interpretation

3.2 hours + 3 hours + 9.47 hours + 9.4 hours +
7.4 hours + 10 hours + 10.5 hours + 11.5 hours + 12.3 hours +
12.5 hours + 12.5 hours + 12.45 hours + 12.5 hours + 16 hours

Result

142.72 hours

(16hours + 12.20hours + 12.50hours + 3.20hours + 6hours + 9.30hours + 9.30hours + 10.50hours +11.50hours + 12.7h + 2.30h)

Input interpretation

16 hours + 12.2 hours + 12.5 hours + 3.2 hours + 6 hours +
9.3 hours + 9.3 hours + 10.5 hours + 11.5 hours + 12.7 hours + 2.3 hours

Result

105.5 hours

(7.56hours + 7.40hours + 7.56hours + 8.26hours + 10.20hours + 10.30hours + 13.14hours)

Input interpretation

7.56 hours + 7.4 hours + 7.56 hours +
8.26 hours + 10.2 hours + 10.3 hours + 13.14 hours

Result

64.42 hours

(63.97hours + 142.72hours + 105.5hours + 64.42hours)

Input interpretation

63.97 hours + 142.72 hours + 105.5 hours + 64.42 hours

Result

376.6 hours

From which:

4(63.97 + 142.72 + 105.5 + 64.42)+233-Pi^2-euler mascheroni const

Input interpretation

$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma$

γ is the Euler-Mascheroni constant

Result

1728.99…

1728.99….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

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Alternative representations

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = 1739.44 + \psi(1) - \pi^2$$

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = 1739.44 - \pi^2 - \gamma_0$$

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = 1739.44 + \psi(1) - (180\,^\circ)^2$$

$\psi(x)$ is the digamma function

γ_n is the n^{th} Stieltjes constant

Series representations

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = -16\left(-108.715 + \left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2 + 0.0625 \sum_{k=2}^{\infty} \frac{(-1)^k\,\zeta(k)}{k}\right)$$

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = -16\left(-108.715 + \left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2 + 0.0625 \sum_{k=2}^{\infty} \frac{(-1+k)\,(-1+\zeta(k))}{k}\right)$$

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = -16\left(-108.653 + \left(\sum_{k=1}^{\infty} \tan^{-1}\left(\frac{1}{F_{1+2k}}\right)\right)^2 - 0.0625 \sum_{k=2}^{\infty} \frac{-1+\zeta(k)}{k}\right)$$

$\zeta(s)$ is the Riemann zeta function

F_n is the n^{th} Fibonacci number

$\tan^{-1}(x)$ is the inverse tangent function

Integral representations

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = -4\left(-434.86 + \left(\int_0^{\infty} \frac{1}{1+t^2}\,dt\right)^2 - 0.25 \int_0^{\infty} e^{-t} \log(t)\,dt\right)$$

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = -4\left(-434.86 + \left(\int_0^{\infty} \frac{1}{1+t^2}\,dt\right)^2 - 0.25 \int_0^{1} \log\left(\log\left(\frac{1}{t}\right)\right)dt\right)$$

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = -4\left(-434.86 + \left(\int_0^{\infty} \frac{1}{1+t^2}\,dt\right)^2 - 0.25 \int_0^{1} \log(-\log(t))\,dt\right)$$

log(x) is the natural logarithm

(4(63.97 + 142.72 + 105.5 + 64.42)+233-Pi^2-euler mascheroni const)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\sqrt[15]{4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma} + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

γ is the Euler-Mascheroni constant

C_{MRB} is the MRB constant

Result

1.64493759185923755767277776251854016466851880961840117305325288 10…

1.64493759…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

(1/27((4(63.97 + 142.72 + 105.5 + 64.42)+233-Pi^2-euler mascheroni const)-1))^2

Input interpretation

$$\left(\frac{1}{27}\left(\left(4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma\right) - 1\right)\right)^2$$

γ is the Euler-Mascheroni constant

Result

4095.97…

4095.97…. ≈ 4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

MAREA OCEANICA.

indipendente (o quasi) da movimenti sismici.

Sua probabile diffusione: Oceano indiano e golfi dipendenti. Coste dell'Africa meridionale. Coste del Brasile. Alcune coste ed isole sparse dell'Oceania.

Ore dei porti sulle spiaggie aperte.

AFRICA

Is. Madagascar	4h 15′
„ Mayotte	4 10
„ Amirauté	5 —
„ Mozambico	4 7
Capo di Buona Speranza	3 —
Baja della Tavola	2 51
„ Saldanha	2 30
„ S. Elena	2 26
„ Simon	3 —
Capo Serra	2 56
Angra Pequena	2 30
San Paolo di Loando	4 26
Entrata del Benin	4 10
„ „ Niger	4 —
„ „ Bonny	4 56
Isola S. Tommaso	4 16
Riviera di Gabon	4 56
Isola del Nord (Sherboro)	5h 56′

(congiunzione con la marea delle Antille)

BRASILE

Porto S. Elena	3 46
Is. S. Caterina	2 40
S. Sebastiano	1 56
Rio Janeiro	2 40
Capo Frio	1 36
Baia S. Spirito	2 56
Bahia	4 10
Pernambuco	4 58
Paraiba	4 20
Ciara	4 36
S. Luigi di Maranhao	(7 —)
Cajenna	4 33
Isole Salut	4 24
Nuova Amsterdam	3 46

(4.15hours + 4.10hours + 5hours + 4.7hours + 3hours + 2.51hours + 2.30hours + 2.26hours + 3hours + 2.56hours + 2.30hours + 4.26hours + 4.10hours + 4hours + 4.56hours + 4.16hours + 4.56hours)

Input interpretation

4.15 hours + 4.1 hours + 5 hours + 4.7 hours +
3 hours + 2.51 hours + 2.3 hours + 2.26 hours + 3 hours

Result

31.02 hours

(31.02hours + 2.56hours + 2.30hours + 4.26hours + 4.10hours + 4hours + 4.56hours + 4.16hours + 4.56hours)

Input interpretation

31.02 hours + 2.56 hours + 2.3 hours + 4.26 hours +
4.1 hours + 4 hours + 4.56 hours + 4.16 hours + 4.56 hours

Result

61.52 hours

From which, we obtain also:

((31.02 + 2.56 + 2.30 + 4.26 + 4.10 + 4 + 4.56 + 4.16 + 4.56)+e-0.9568666373*MRB const)^2-2Pi-2Φ

Input interpretation

$$((31.02 + 2.56 + 2.3 + 4.26 + 4.1 + 4 + 4.56 + 4.16 + 4.56) + e + C_{\text{MRB}} \times (-0.9568666373))^2 - 2\pi - 2\Phi$$

C_{MRB} is the MRB constant

Φ is the golden ratio conjugate

Result

4095.98…

4095.98…. ≈ 4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

27*sqrt(((31.02 + 2.56 + 2.30 + 4.26 + 4.10 + 4 + 4.56 + 4.16 + 4.56)+e-0.9568666373*MRB const)^2-2Pi-2Φ)+1

Input interpretation

$$27\sqrt{\left(\left((31.02 + 2.56 + 2.3 + 4.26 + 4.1 + 4 + 4.56 + 4.16 + 4.56) + e + C_{\text{MRB}} \times (-0.9568666373)\right)^2 - 2\pi - 2\Phi\right) + 1}$$

C_{MRB} is the MRB constant

Φ is the golden ratio conjugate

Result

1728.99…

1728.99….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2.

Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

((27*sqrt(((31.02 + 2.56 + 2.30 + 4.26 + 4.10 + 4 + 4.56 + 4.16 + 4.56)+e-0.9568666373*MRB const)^2-2Pi-2Φ)+1))^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\left(27\sqrt{(((31.02 + 2.56 + 2.3 + 4.26 + 4.1 + 4 + 4.56 + 4.16 + 4.56) + e + C_{\text{MRB}} \times (-0.9568666373))^2 - 2\pi - 2\Phi) + 1}\right) \text{^ } (1/15) + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Φ is the golden ratio conjugate

Result

1.644937695209311134786835972446422663008743984156066501970796554 3…

1.6449376952…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

We have also:

(3.46hours + 2.40hours + 1.56hours + 2.40hours + 1.36hours + 2.56hours + 4.10hours + 4.58hours + 4.20hours + 4.36hours + 7.00hours +4.33hours + 4.24hours + 3.46hours)

Input interpretation

3.46 hours + 2.4 hours + 1.56 hours + 2.4 hours +
1.36 hours + 2.56 hours + 4.1 hours + 4.58 hours + 4.2 hours +
4.36 hours + 7. hours + 4.33 hours + 4.24 hours + 3.46 hours

Result

50.01 hours

From which, we obtain also:

16(61.52 + 50.01)-55-1/2

Input

$$16\,(61.52 + 50.01) - 55 - \frac{1}{2}$$

Result

1728.98

1728.98

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number).

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Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

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(1/27((16(61.52 + 50.01)-55-1/2)-1))^2

Input

$$\left(\frac{1}{27}\left(\left(16\,(61.52+50.01)-55-\frac{1}{2}\right)-1\right)\right)^2$$

Result

4095.905185733882030178326474622770919067215363511659807956104252 4

…

4095.905185733882…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

(16(61.52 + 50.01)-55-1/2)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{16\,(61.52 + 50.01) - 55 - \frac{1}{2}} + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.644936756481058552610763286429777292462197445125341722274885813 7

…

1.644936756…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

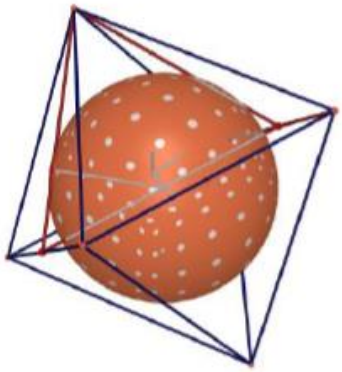


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\ z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\ x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\, l^3}{\frac{1}{3}\left(4\,\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\,\lfloor \arg(2-z_0)/(2\pi)\rfloor}\, z_0^{1/2\,(1+\lfloor \arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\, l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93
…

1.644934066848226… = $\zeta(2) = \pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \phi^2}} + 1$$

Decimal approximation

1.645297378520776032771896229793728200454953421110291570825393928 6

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1 + \frac{1}{\sqrt[3]{\left(\phi^2 + \frac{2\pi}{3} C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \phi^2}} + 1\right)}$$

Decimal approximation

3.14193957152658430892433073219616263267751338681165904468254173 93

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{\text{MRB}})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}\approx 3.1419 \quad \text{(real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}\approx -3.1419 \quad \text{(real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0\in\mathbb{R}$ and $-\infty<z_0\le 0$))

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x\in\mathbb{R}$ and $x<0$)

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$
$$4\left(\frac{1}{z_0}\right)^{\lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor \arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

6π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8].

Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$
$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

$4096 = 64^2$, (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). (From: “Dilaton Tadpole for the Open Bosonic String “ Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$). The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.61805\overline{}$ (period 1)

Series representations

$$\frac{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+\right.$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}\right)$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$$\frac{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+\right.$$
$$27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^{\,8}\right)}{2\pi}\right\rfloor\right)\sqrt{x}$$
$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^{\,8}\right)^k}{k!}\right) \text{ for } (x \in \mathbb{R} \text{ and } x < 0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$

$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^{\,8}-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^{\,8}-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi\, e^0 \approx 3.1416$ (real, principal root)

$\pi\, e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1 \sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003 \quad \text{(real, principal root)}$$

$$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003 \quad \text{(real root)}$$

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\pi \left\lfloor \frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k \left(\frac{8}{\pi^2}-x\right)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=$$

$$\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\ a^3\right)\left(\sqrt{2}\ d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\frac{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}{3\times3}}}} =$$

$$\sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\right.\right.\right.$$

$$\left.\left.\left. z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)\Big/$$

$$\left.\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13
…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano's Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\left(\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}(C\times \mathrm{R}\times 2.33\cdot 10^{-13})}}\cong 1.61803398\ldots=\frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.6180359123482642354401744088347098542545273508401733563064818107
…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$0.809018\, x^2\, y\, z$ + constant

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

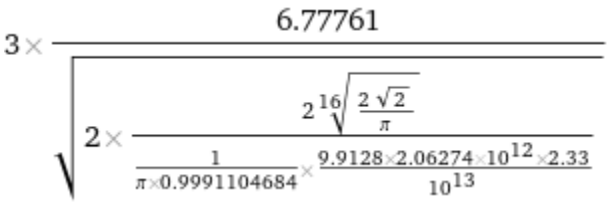
8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation



Result

12.5664…

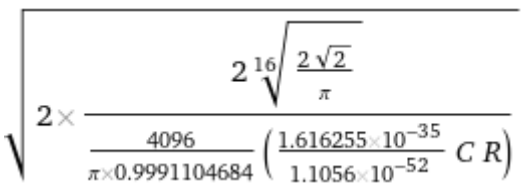
12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals (2√2)/π) is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

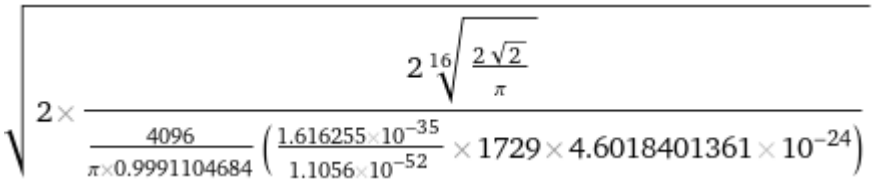
From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))



which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...



1.6180329973075324915067570166297467464225772608929671407919395903
…

1.6180329973075… result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.4525642121\times 10^{-24}\right)}}$$

Result

1.64493235210209213048389898370415116887662184165516687791416603 38

…

1.64493235210209213…≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

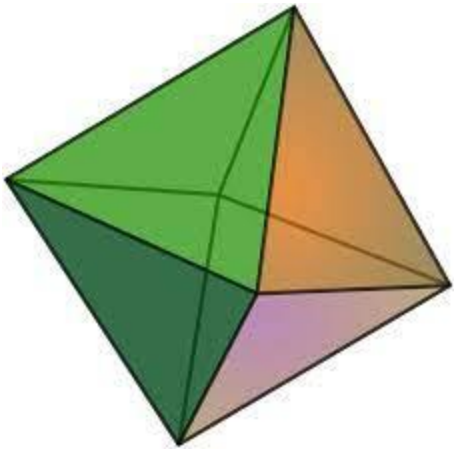
Result

3.14159225731469939399500392316057964697311717816444239557900247 97

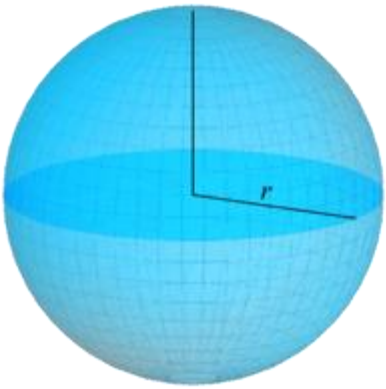
…

3.14159225731469…≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find a, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

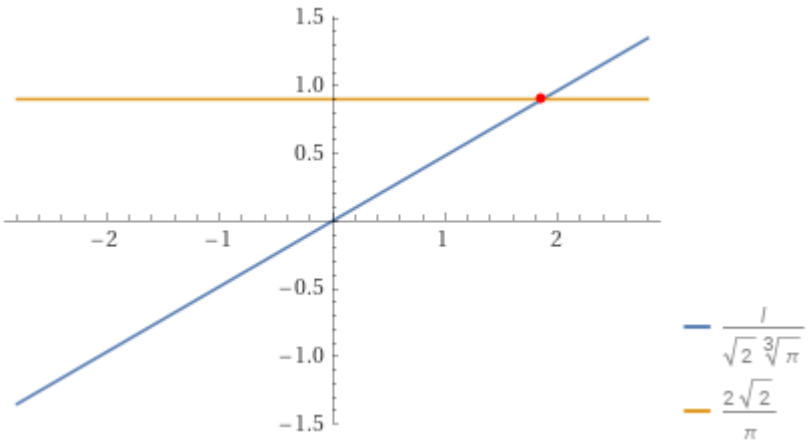
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **$f_0(1710)$ scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256x^8 + 95\,744x^7 - 3\,248\,750\,080x^6 - 914\,210\,725\,504x^5 + 15\,498\,355\,554\,921\,184x^4 + 2\,911\,478\,392\,539\,914\,656x^3 - 32\,941\,144\,911\,224\,677\,091\,680x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi =$$
$$\left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

.

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not}\ (z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

$1.64381856858\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\,\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\,\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\text{^}\,(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\text{^}(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\text{^}(1/15)\right)$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)}\quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning p, C, β_E and ϕ correspond to the exponents of e (i.e. of exp). Thence we obtain for p = 5 and $\beta_E = 1/2$:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

−5.010882647757...

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k (0.006665017846190000 - z_0)^k z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\;\phi\;e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\;\phi\;e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $b=-\frac{226\,802\,245}{18\,480\,874}$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

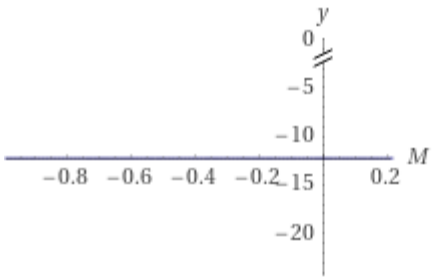
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

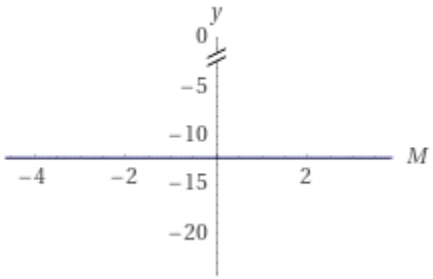
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

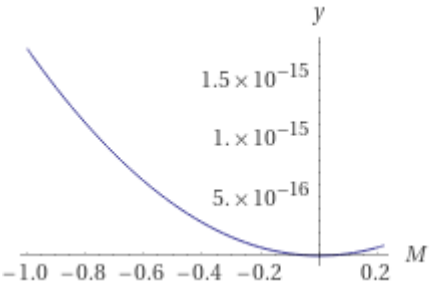
Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

Result:

0

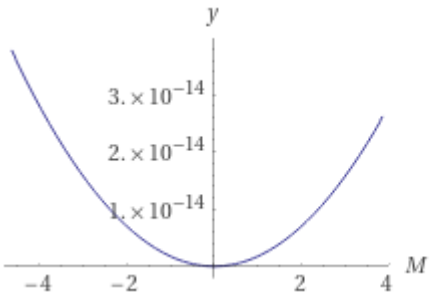
Plots: **(possible mathematical connection with an open string)**



(*M* from −1 to 0.2)

M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$$O\left(M^{62194}\right)$$

(Taylor series)

Series expansion at M = ∞:

$$1.75541\times10^{-15}\,M^2+O\left(\left(\frac{1}{M}\right)^{62194}\right)$$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^\infty\left(\frac{1}{3}\,M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2(-0.5^2)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^-16

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$$7.021621519159432725583532534049408333333333333333333333333\ldots\times10^{-17}$$

7.021621519159*10^-17

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875\times10^{-14}$

1.57986484181*10^{-14}

For M = 2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times 2^2+6.58545\times 10^{-10}\sqrt{2^4}\right)}{2^2}+1\right)^2\times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333333\ldots\times 10^{-15}$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

$5.9776991059*10^{-8}$ result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^{2} = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\ \hat{}\ (1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\ \sqrt[4]{3}\ e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182...

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

$5.729475 * 10^{-35}$ Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

$1.820306 * 10^{61}$ V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

$5.975498*10^{-8}$ V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

$1.042940*10^{27}$ V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * I_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * I_P^2 / I_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

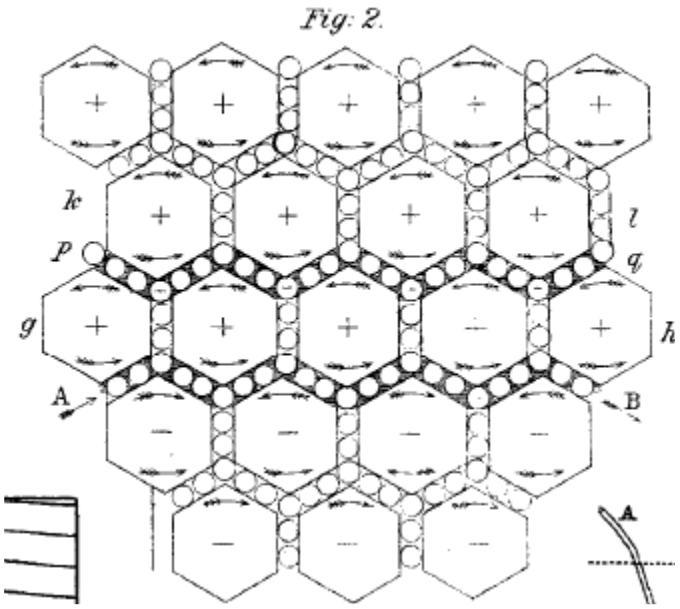
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

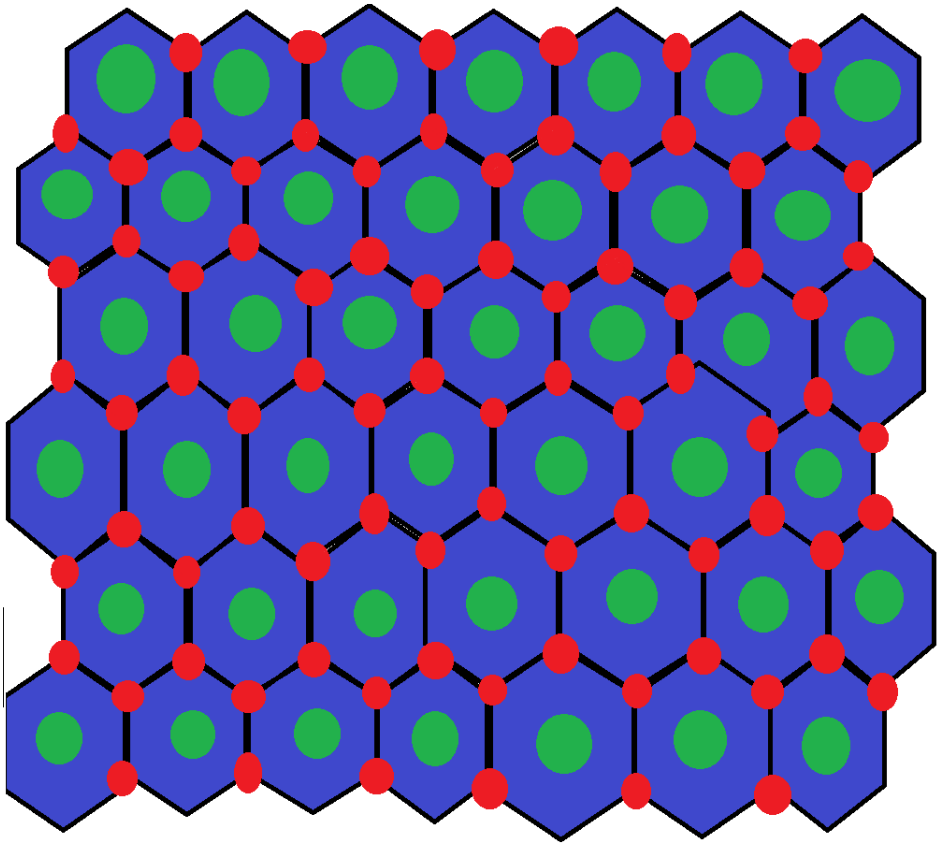
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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On the study of some historical earthquakes: Towards a mathematical-statistical model for the prediction of endogenous phenomena

A Number Theoretic Analysis of the Enthalpy, Enthalpy Energy Density, Thermodynamic Volume, and the Equation of State of a Modified White Hole, and the Implications to the Quantum Vacuum Spacetime, Matter Creation and the Planck Frequency. - *Nardelli, M., Kubeka, A.S. and Amani, A.* (2024) - Journal of Modern Physics , 15, 1-50. - https://doi.org/10.4236/jmp.2024.151001

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Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On some equations concerning the seismology and the calculation relating to the tides and solar eclipses. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory III

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper (part III), we analyze some equations concerning the seismology and the calculation relating to the tides and solar eclipses. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory

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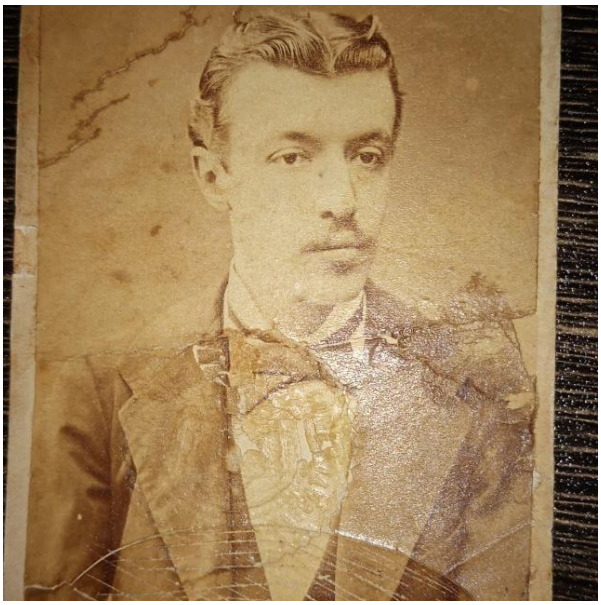
Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

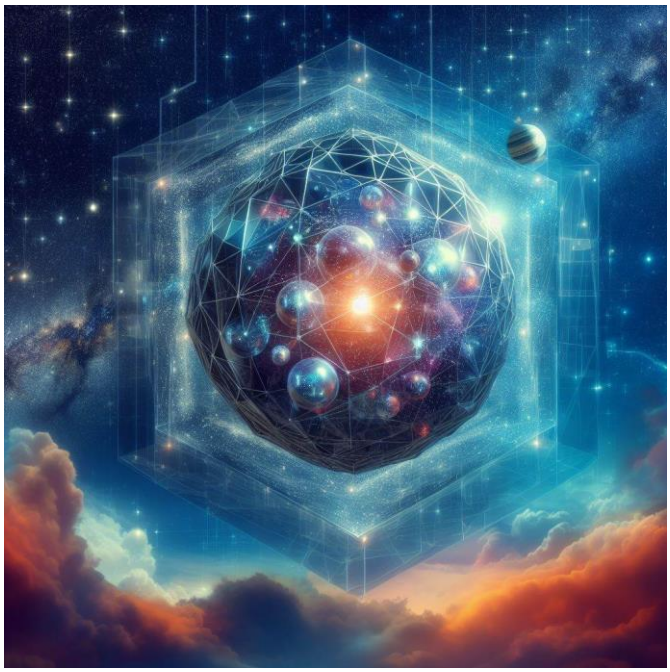
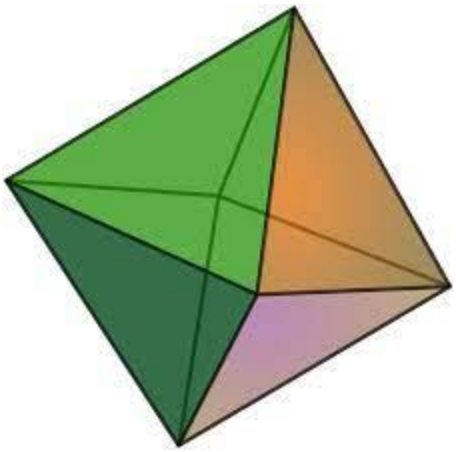
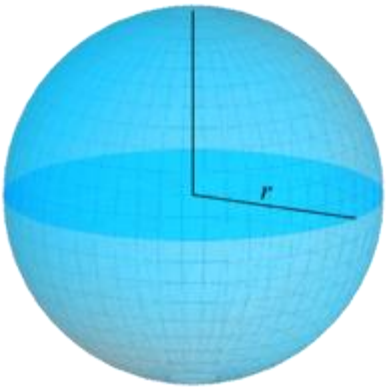


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\pi x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$l = 0, \quad x = 0$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt{2}\ \sqrt[3]{\pi}\right) = \log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\ \pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

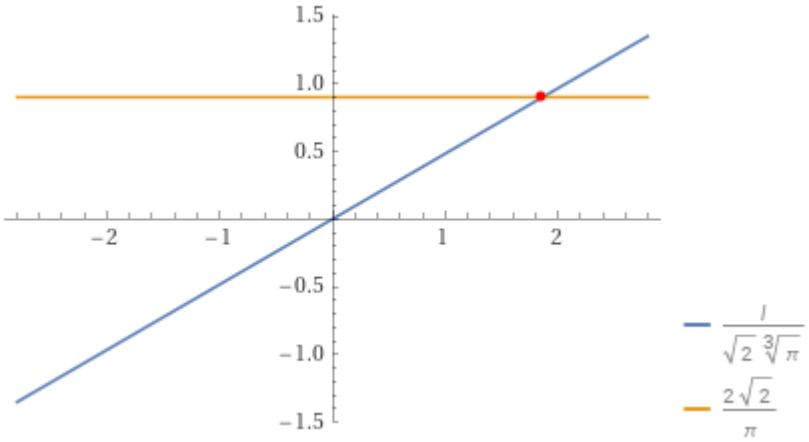
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

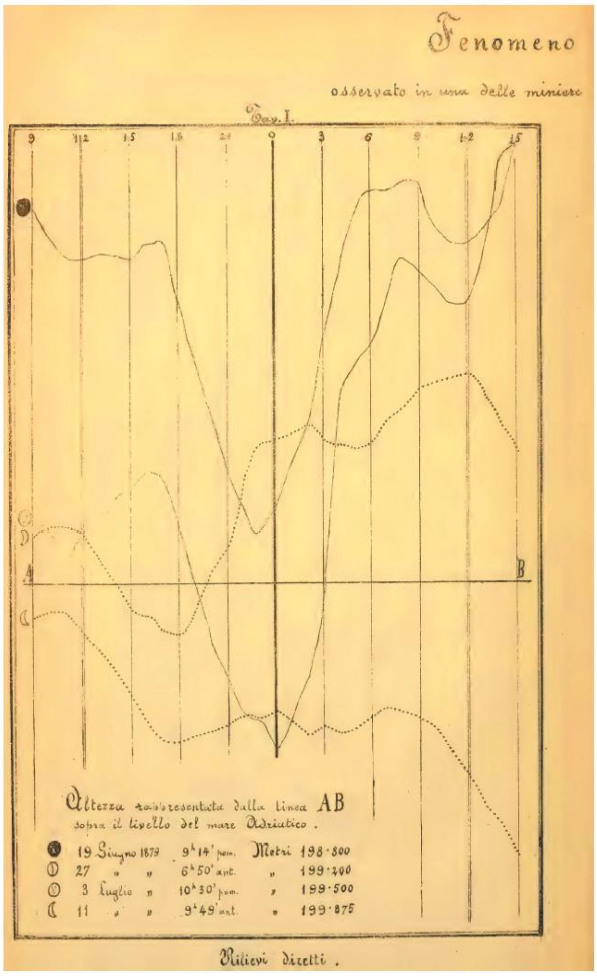
Plot

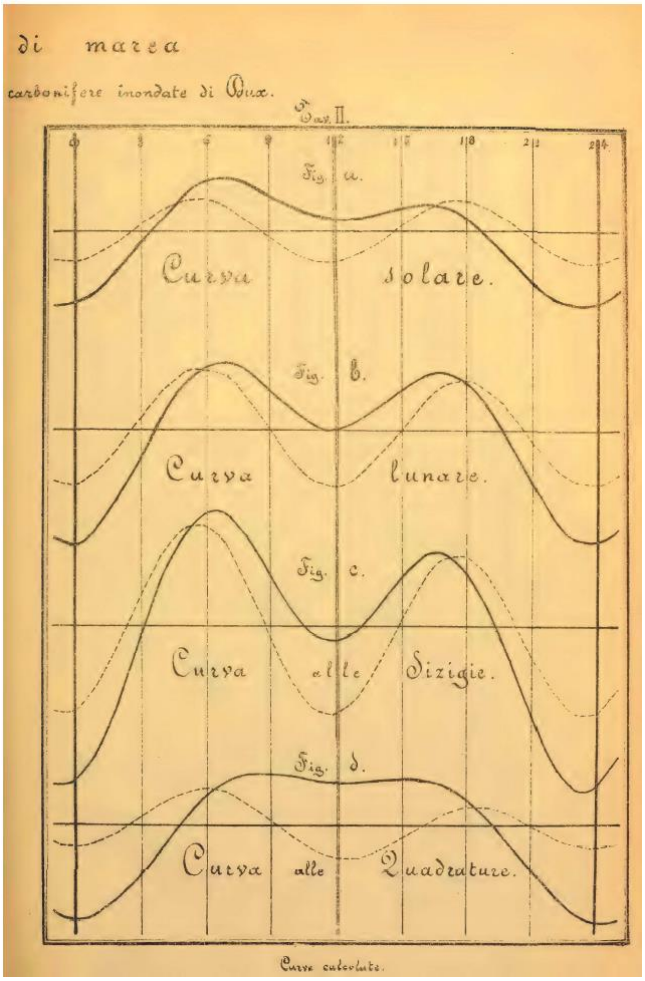


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

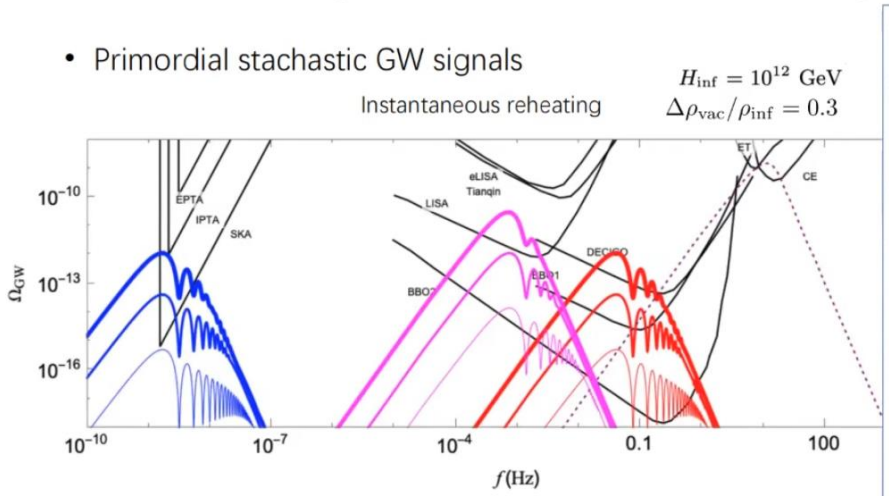

di marea
carbonifere inondate di Pux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

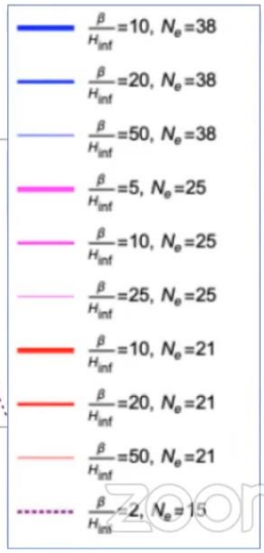
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

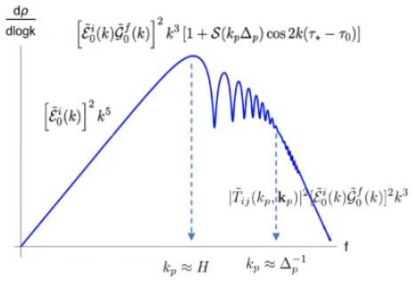
Comparison between primary GW and secondary GW

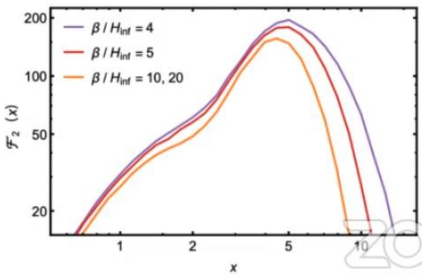
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





From

Calcolo Approssimativo della Congiunzione Apparente per le Occultazioni lunari – Nota del *Prof. Giulio Grablovitz*

We analyze the following formula

$$C = \frac{\text{sen } h}{p' \sec \theta - 0.2618 \cos h}$$

We consider:

(sin(h))/(p_1 sec(θ) – 0.2618 cos(h))

Input

$$\frac{\sin(h)}{p_1 \sec(\theta) - 0.2618 \cos(h)}$$

$\sec(x)$ is the secant function

Alternate form assuming h, θ, and p_1 are real

$$\frac{\sin(h)}{\frac{2 p_1 \cos(\theta)}{\cos(2\theta)+1} - 0.2618 \cos(h)} + 0$$

Alternate forms

$$\frac{1}{p_1 \csc(h) \sec(\theta) - 0.2618 \cot(h)}$$

$$-\frac{3.81971 \sin(h)}{\cos(h) - 3.81971\ p_1 \sec(\theta)}$$

$$-\frac{\sin(h)\cos(\theta)}{0.2618\cos(h)\cos(\theta)-p_1}$$

$\cot(x)$ is the cotangent function

$\csc(x)$ is the cosecant function

Derivative

$$\frac{\partial}{\partial p_1}\left(\frac{\sin(h)}{p_1\sec(\theta)-0.2618\cos(h)}\right)=-\frac{\sin(h)\sec(\theta)}{(p_1\sec(\theta)-0.2618\cos(h))^2}$$

Roots

$5000\,p_1\sec(\theta)-1309\neq 0\,,\quad h=2\pi n\,,\quad n\in\mathbb{Z}$

$5000\,p_1\sec(\theta)+1309\neq 0\,,\quad h=2\pi n+\pi\,,\quad n\in\mathbb{Z}$

$\mathbb{Z}$ is the set of integers

Property as a function

Periodicity

periodic in h with period 2π
periodic in θ with period 2π

Series expansion at $p_1=0$

$$-3.81971\tan(h)-14.5902\,p_1\,(\tan(h)\sec(h)\sec(\theta))-55.7303\,p_1^2\left(\tan(h)\sec^2(h)\sec^2(\theta)\right)-212.873\,p_1^3\left(\tan(h)\sec^3(h)\sec^3(\theta)\right)-813.115\,p_1^4\left(\tan(h)\sec^4(h)\sec^4(\theta)\right)+O\left(p_1^5\right)$$

(Taylor series)

Series expansion at $p_1=\infty$

$$\frac{\sin(h)\cos(\theta)}{p_1}+\frac{0.2618\sin(h)\cos(h)\cos^2(\theta)}{p_1^2}+\frac{0.0685392\sin(h)\cos^2(h)\cos^3(\theta)}{p_1^3}+\frac{0.0179436\sin(h)\cos^3(h)\cos^4(\theta)}{p_1^4}+O\left(\left(\frac{1}{p_1}\right)^5\right)$$

(Laurent series)

Indefinite integral

$$\int \frac{\sin(h)}{p_1 \sec(\theta) - 0.2618 \cos(h)}\, dp_1 =$$
$$\sin(h)\cos(\theta)\log(p_1 \csc(h)\sec(\theta) - 0.2618\cot(h)) + \text{constant}$$

(assuming a complex-valued logarithm)

$\log(x)$ is the natural logarithm

Limit

$$\lim_{p_1 \to \pm\infty} \frac{\sin(h)}{-0.2618\cos(h) + \sec(\theta)\, p_1} = 0 \approx 0$$

Alternative representations

$$\frac{\sin(h)}{p_1 \sec(\theta) - 0.2618\cos(h)} = \frac{-e^{-i\,h} + e^{h\,i}}{(2\,i)\left(-0.1309\left(e^{-i\,h} + e^{h\,i}\right) + \frac{p_1}{\cos(\theta)}\right)}$$

$$\frac{\sin(h)}{p_1 \sec(\theta) - 0.2618\cos(h)} = \frac{-e^{-i\,h} + e^{h\,i}}{(2\,i)\left(-0.2618\cosh(-i\,h) + \frac{2\,e^{i\,\theta}\,p_1}{1+e^{2\,i\,\theta}}\right)}$$

$$\frac{\sin(h)}{p_1 \sec(\theta) - 0.2618\cos(h)} = \frac{-e^{-i\,h} + e^{h\,i}}{(2\,i)\left(-0.2618\cosh(-i\,h) + \frac{2\,p_1}{e^{-i\,\theta}+e^{i\,\theta}}\right)}$$

i is the imaginary unit

$\cosh(x)$ is the hyperbolic cosine function

Series representations

$$\frac{\sin(h)}{p_1 \sec(\theta) - 0.2618\cos(h)} = -\frac{0.5\sum_{k=0}^{\infty}\frac{(-1)^k\,h^{1+2\,k}}{(1+2\,k)!}}{p_1\sum_{k=1}^{\infty}(-1)^k\,q^{-1+2\,k} + 0.1309\sum_{k=0}^{\infty}\frac{(-1)^k\,h^{2\,k}}{(2\,k)!}}$$

for $q = e^{i\,\theta}$

$$\frac{\sin(h)}{p_1 \sec(\theta) - 0.2618 \cos(h)} = -\frac{0.443113\, h \sum_{j=0}^{\infty} \text{Res}_{s=-j} \frac{4^s (h^2)^{-s} \Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}}{p_1 \sum_{k=1}^{\infty} (-1)^k q^{-1+2k} + 0.1309 \sum_{k=0}^{\infty} \frac{(-1)^k h^{2k}}{(2k)!}}$$

for $q = e^{i\theta}$

$$\frac{\sin(h)}{p_1 \sec(\theta) - 0.2618 \cos(h)} = -\frac{0.5 \sum_{k=0}^{\infty} \frac{(-1)^k h^{1+2k}}{(1+2k)!}}{p_1 \sum_{k=1}^{\infty} (-1)^k q^{-1+2k} + 0.232014 \sum_{j=0}^{\infty} \text{Res}_{s=-j} \frac{4^s (h^2)^{-s} \Gamma(s)}{\Gamma\left(\frac{1}{2}-s\right)}} \quad \text{for } q = e^{i\theta}$$

$n!$ is the factorial function

$\Gamma(x)$ is the gamma function

$\text{Res}_{z=z_0} f$ is a complex residue

From the indefinite integral result

$$\int \frac{\sin(h)}{p_1 \sec(\theta) - 0.2618 \cos(h)}\, dp_1 = \sin(h) \cos(\theta) \log(p_1 \csc(h) \sec(\theta) - 0.2618 \cot(h)) + \text{constant}$$

(assuming a complex-valued logarithm)

we obtain:

sin(h) cos(θ) log(p_1 csc(h) sec(θ) - 0.2618 cot(h))

Input

$\sin(h) \cos(\theta) \log(p_1 \csc(h) \sec(\theta) - 0.2618 \cot(h))$

$\csc(x)$ is the cosecant function

$\sec(x)$ is the secant function

$\cot(x)$ is the cotangent function

$\log(x)$ is the natural logarithm

Alternate forms

$$\cos(\theta)\log\left(-\frac{0.2618\cos(h)}{\sin(h)}+\frac{p_1}{\cos(\theta)\sin(h)}\right)\sin(h)$$

$$\sin(h)\cos(\theta)$$
$$\log((-0.06545+0\,i)\csc(h)\sec(\theta)(2\cos(h-\theta)+2\cos(h+\theta)-15.2788\,p_1))$$

$$\frac{1}{4}\,i\left(e^{-i\,h}-e^{i\,h}\right)\left(e^{-i\,\theta}+e^{i\,\theta}\right)\log\left(\frac{(0.2618\,i)\left(e^{-i\,h}+e^{i\,h}\right)}{e^{-i\,h}-e^{i\,h}}-\frac{4\,i\,p_1}{\left(e^{-i\,h}-e^{i\,h}\right)\left(e^{-i\,\theta}+e^{i\,\theta}\right)}\right)$$

Root

$$0.159155\,(h-3.14159)\notin\mathbb{Z}\,,\quad \cos(\theta)\tan(0.5\,h)\neq 0\,,$$
$$p_1\approx\frac{0.0002\left(-1309\cos(\theta)\tan^2(0.5\,h)+10\,000\cos(\theta)\tan(0.5\,h)+1309\cos(\theta)\right)}{\tan^2(0.5\,h)+1}$$

$\mathbb{Z}$ is the set of integers

Root for the variable p_1

$$p_1\approx\cos(\theta)\,(0.2618\cot(h)+1)\sin(h)$$

Series expansion at $p_1=0$

$$\sin(h)\cos(\theta)\log(-0.2618\cot(h))-3.81971\,p_1\tan(h)-$$
$$7.29509\,p_1^2\,(\tan(h)\sec(h)\sec(\theta))-18.5768\,p_1^3\left(\tan(h)\sec^2(h)\sec^2(\theta)\right)-$$
$$53.2184\,p_1^4\left(\tan(h)\sec^3(h)\sec^3(\theta)\right)+O\left(p_1^5\right)$$

(Taylor series)

Series expansion at $p_1=\infty$

$$\sin(h)\cos(\theta)\log(p_1\csc(h)\sec(\theta)) - \frac{0.2618\left(\sin(h)\cos(h)\cos^2(\theta)\right)}{p_1} - \frac{0.0342696\left(\sin(h)\cos^2(h)\cos^3(\theta)\right)}{p_1^2} - \frac{0.00598119\left(\sin(h)\cos^3(h)\cos^4(\theta)\right)}{p_1^3} + O\left(\left(\frac{1}{p_1}\right)^4\right)$$

(Puiseux series)

Derivative

$$\frac{\partial}{\partial p_1}(\sin(h)\cos(\theta)\log(p_1\csc(h)\sec(\theta) - 0.2618\cot(h))) = \frac{1}{p_1\csc(h)\sec(\theta) - 0.2618\cot(h)}$$

Indefinite integral

$$\int \sin(h)\cos(\theta)\log(p_1\csc(h)\sec(\theta) - 0.2618\cot(h))\,dp_1 = \sin(h)\cos(\theta)(-0.2618(\cos(h)\cos(\theta) - 3.81971\,p_1)\log(p_1\csc(h)\sec(\theta) - 0.2618\cot(h)) - p_1) + \text{constant}$$

(assuming a complex-valued logarithm)

From the indefinite integral result

$$\int \sin(h)\cos(\theta)\log(p_1\csc(h)\sec(\theta) - 0.2618\cot(h))\,dp_1 = \sin(h)\cos(\theta)(-0.2618(\cos(h)\cos(\theta) - 3.81971\,p_1)\log(p_1\csc(h)\sec(\theta) - 0.2618\cot(h)) - p_1) + \text{constant}$$

(assuming a complex-valued logarithm)

sin(h) cos(θ) (-0.2618 (cos(h) cos(θ) - 3.81971 p_1) log(p_1 csc(h) sec(θ) - 0.2618 cot(h)) - p_1)

for h = 2, p_1 = 4, θ = π/8:

sin(2) cos(π/8) (-0.2618 (cos(2) cos(π/8) - 3.81971*4) log(4 csc(2) sec(π/8) - 0.2618 cot(2)) - 4)

Input interpretation

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)+4\times(-3.81971)\right)\right.$$
$$\left.\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)$$

$\csc(x)$ is the cosecant function

$\sec(x)$ is the secant function

$\cot(x)$ is the cotangent function

$\log(x)$ is the natural logarithm

Result

2.10120322927062732202116269986243240541594516383505906846514282 93

…

2.10120322927….

Alternative representations

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\right.$$
$$\left.\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)=$$
$$\cosh\left(-\frac{i\pi}{8}\right)\cos\left(-2+\frac{\pi}{2}\right)\left(-4-0.2618\left(-15.2788+\cosh(-2i)\cosh\left(-\frac{i\pi}{8}\right)\right)\right.$$
$$\left.\log(a)\log_a\left(-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)\right)$$

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\right.$$
$$\left.\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)=$$
$$\frac{1}{2i}\cosh\left(-\frac{i\pi}{8}\right)\left(-4-0.2618\left(-15.2788+\cosh(-2i)\cosh\left(-\frac{i\pi}{8}\right)\right)\right.$$
$$\left.\log(a)\log_a\left(-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)\right)\left(-e^{-2i}+e^{2i}\right)$$

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)=\frac{1}{2}\cos\left(-2+\frac{\pi}{2}\right)\left(e^{-(i\pi)/8}+e^{(i\pi)/8}\right)\left(-4-0.2618\log_e\left(-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)\left(-15.2788+\frac{1}{4}\left(e^{-2i}+e^{2i}\right)\left(e^{-(i\pi)/8}+e^{(i\pi)/8}\right)\right)\right)$$

$\cosh(x)$ is the hyperbolic cosine function

$\log_b(x)$ is the base-b logarithm

i is the imaginary unit

Series representations

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)=\left(J_0\left(\frac{\pi}{8}\right)+2\sum_{k=1}^{\infty}(-1)^k J_{2k}\left(\frac{\pi}{8}\right)\right)\left(\sum_{k=0}^{\infty}\frac{(-1)^k 2^{1+2k}}{(1+2k)!}\right)\left(-4-0.2618\left(-15.2788+\left(J_0(2)+2\sum_{k=1}^{\infty}(-1)^k J_{2k}(2)\right)\left(J_0\left(\frac{\pi}{8}\right)+2\sum_{k=1}^{\infty}(-1)^k J_{2k}\left(\frac{\pi}{8}\right)\right)\right)\left(\log\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)^{-k}}{k}\right)\right)$$

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)=$$
$$2\left(J_0\left(\frac{\pi}{8}\right)+2\sum_{k=1}^{\infty}(-1)^k J_{2k}\left(\frac{\pi}{8}\right)\right)\left(\sum_{k=0}^{\infty}(-1)^k J_{1+2k}(2)\right)\left(-4-0.2618\left(-15.2788+\left(J_0(2)+2\sum_{k=1}^{\infty}(-1)^k J_{2k}(2)\right)\left(J_0\left(\frac{\pi}{8}\right)+2\sum_{k=1}^{\infty}(-1)^k J_{2k}\left(\frac{\pi}{8}\right)\right)\right)\left(\log\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)^{-k}}{k}\right)\right)$$

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)=-0.5236\left(\sum_{k=0}^{\infty}(-1)^k J_{1+2k}(2)\right)\left(15.2788\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{64}\right)^k\pi^{2k}}{(2k)!}-15.2788\log\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{64}\right)^k\pi^{2k}}{(2k)!}+\log\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)\left(\sum_{k=0}^{\infty}\frac{(-4)^k}{(2k)!}\right)\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{64}\right)^k\pi^{2k}}{(2k)!}\right)^2-\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{64}\right)^k\pi^{2k}}{(2k)!}\right)^2-\sum_{k_1=0}^{\infty}\sum_{k_2=1}^{\infty}\frac{(-4)^{k_1}(-1)^{k_2}\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)^{-k_2}}{(2k_1)!\,k_2}+15.2788\sum_{k_1=0}^{\infty}\sum_{k_2=1}^{\infty}\frac{(-1)^{k_1+k_2}\,64^{-k_1}\,\pi^{2k_1}\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)^{-k_2}}{(2k_1)!\,k_2}\right)$$

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)=-0.2618\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{64}\right)^k\pi^{2k}}{(2k)!}\right)\left(15.2788\sum_{k=0}^{\infty}\frac{(-1)^k\,2^{1+2k}}{(1+2k)!}-15.2788\log\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)\sum_{k=0}^{\infty}\frac{(-1)^k\,2^{1+2k}}{(1+2k)!}+15.2788\sum_{k_1=0}^{\infty}\sum_{k_2=1}^{\infty}\frac{(-1)^{k_1+k_2}\,2^{1+2k_1}\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)^{-k_2}}{(1+2k_1)!\,k_2}+\log\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\sum_{k_3=0}^{\infty}\frac{(-1)^{k_1+k_2+k_3}\,2^{1+2k_1-6k_2+2k_3}\,\pi^{2k_2}}{(2k_1)!\,(2k_2)!\,(1+2k_3)!}-\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\sum_{k_3=0}^{\infty}\sum_{k_4=1}^{\infty}\left((-1)^{k_1+k_2+k_3+k_4}\,2^{1+2k_1-6k_2+2k_3}\,\pi^{2k_2}\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)^{-k_4}\right)\Big/\left((2k_1)!\,(2k_2)!\,(1+2k_3)!\,k_4\right)\right)$$

$J_n(z)$ is the Bessel function of the first kind

$n!$ is the factorial function

Integral representations

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)=0.5236\left(\int_0^1\cos(2t)\,dt\right)\left(15.2788\int_{\frac{\pi}{2}}^{\frac{\pi}{8}}\sin(t)\,dt-3.81971\int_0^1\int_0^1\frac{\sin\left(\frac{1}{8}\pi(4-3t_2)\right)}{-3.81971+\left(3.81971+\cot(2)-15.2788\csc(2)\sec\left(\frac{\pi}{8}\right)\right)t_1}\,dt_2\,dt_1-3.81971\int_0^1\int_0^1\frac{\sin\left(\frac{1}{2}(\pi-(-4+\pi)t_2)\right)}{-3.81971+\left(3.81971+\cot(2)-15.2788\csc(2)\sec\left(\frac{\pi}{8}\right)\right)t_1}\,dt_2\,dt_1\right)$$

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)=2\left(\int_0^1\cos(2t)\,dt\right)\left(1-\frac{\pi}{8}\int_0^1\sin\left(\frac{\pi t}{8}\right)dt\right)\left(-4-\frac{0.1309\left(-15.2788+\frac{1}{8}\left(-1+2\int_0^1\sin(2t)\,dt\right)\left(-8+\pi\int_0^1\sin\left(\frac{\pi t}{8}\right)dt\right)\right)}{i\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)^{-s}}{\Gamma(1-s)}\,ds\right)\quad\text{for } -1<\gamma<0$$

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)=\frac{1}{i\pi}0.2618\left(\int_0^1\cos(2t)\,dt\right)\left(30.5577\,i\pi\int_{\frac{\pi}{2}}^{\frac{\pi}{8}}\sin(t)\,dt-15.2788\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)^{-s}}{\Gamma(1-s)}\,ds\right)\int_{\frac{\pi}{2}}^{\frac{\pi}{8}}\sin(t)\,dt+\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)\left(-1-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)^{-s}}{\Gamma(1-s)}\,ds\right)\left(\int_{\frac{\pi}{2}}^{2}\sin(t)\,dt\right)\left(\int_{\frac{\pi}{2}}^{\frac{\pi}{8}}\sin(t)\,dt\right)^2\right)\quad\text{for } -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

Multiple-argument formulas

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)=2\cos(1)\left(-1+2\cos^2\left(\frac{\pi}{16}\right)\right)\left(-4-0.2618\left(-15.2788+\left(-1+2\cos^2(1)\right)\left(-1+2\cos^2\left(\frac{\pi}{16}\right)\right)\right)\log\left(-0.1309\cot(1)-\frac{2\csc(1)\sec(1)\sec^2\left(\frac{\pi}{16}\right)}{-2+\sec^2\left(\frac{\pi}{16}\right)}+0.1309\tan(1)\right)\right)\sin(1)$$

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)=2\cos(1)\left(-1+2\cos^2\left(\frac{\pi}{16}\right)\right)\left(-4-0.2618\left(-15.2788+\left(-1+2\cos^2(1)\right)\left(-1+2\cos^2\left(\frac{\pi}{16}\right)\right)\right)\right)\log\left(-0.1309\cot(1)+\frac{2\csc(1)\sec(1)\sec^3\left(\frac{\pi}{24}\right)}{4-3\sec^2\left(\frac{\pi}{24}\right)}+0.1309\tan(1)\right)\sin(1)$$

$$\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)=2\cos(1)\sin(1)\left(1-2\sin^2\left(\frac{\pi}{16}\right)\right)\left(-4-0.2618\log\left(-0.1309\cot(1)+\frac{2\csc(1)\sec(1)\sec^3\left(\frac{\pi}{24}\right)}{4-3\sec^2\left(\frac{\pi}{24}\right)}+0.1309\tan(1)\right)\left(-15.2788+\left(-1+2\sin^2(1)\right)\left(-1+2\sin^2\left(\frac{\pi}{16}\right)\right)\right)\right)$$

From which:

(2(sin(2) cos(π/8) (-0.2618 (cos(2) cos(π/8) - 3.81971*4) log(4 csc(2) sec(π/8) - 0.2618 cot(2)) - 4))-1/5)^6-2*7-φ/2

Input interpretation

$$\left(2\left(\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)+4\times(-3.81971)\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)\right)-\frac{1}{5}\right)^6-2\times 7-\frac{\phi}{2}$$

csc(x) is the cosecant function

sec(x) is the secant function

$\cot(x)$ is the cotangent function

$\log(x)$ is the natural logarithm

ϕ is the golden ratio

Result

4096.00…

4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternative representations

$$\left(2\sin(2)\left(\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\right.\right.\right.$$
$$\left.\left.\left.\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)\right)-\frac{1}{5}\right)^6-$$
$$2\times 7-\frac{\phi}{2}=-14-\frac{\phi}{2}+\left(2\cosh\left(-\frac{i\pi}{8}\right)\cos\left(-2+\frac{\pi}{2}\right)\right.$$
$$\left(-4-0.2618\left(-15.2788+\cosh(-2i)\cosh\left(-\frac{i\pi}{8}\right)\right)\log(a)\right.$$
$$\left.\left.\log_a\left(-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)\right)-\frac{1}{5}\right)^6$$

$$\left(2\sin(2)\left(\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-\right.\right.\right.\right.$$
$$\left.\left.\left.\left.0.2618\cot(2)\right)-4\right)\right)-\frac{1}{5}\right)^6-2\times 7-\frac{\phi}{2}=-14-\frac{\phi}{2}+$$
$$\left(-\frac{1}{5}+\frac{1}{2i}2\cosh\left(-\frac{i\pi}{8}\right)\left(-4-0.2618\left(-15.2788+\cosh(-2i)\cosh\left(-\frac{i\pi}{8}\right)\right)\right)\right.$$
$$\left.\left.\log(a)\log_a\left(-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)\right)\left(-e^{-2i}+e^{2i}\right)\right)^6$$

$$\left(2\sin(2)\left(\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\right.\right.\right.$$
$$\left.\left.\left.\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)\right)-\frac{1}{5}\right)^6-$$
$$2\times 7-\frac{\phi}{2}=-14-\frac{\phi}{2}+\left(-\frac{1}{5}+\cos\left(-2+\frac{\pi}{2}\right)\left(e^{-(i\pi)/8}+e^{(i\pi)/8}\right)\right.$$
$$\left(-4-0.2618\log_e\left(-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)\right.$$
$$\left.\left.\left.\left(-15.2788+\frac{1}{4}\left(e^{-2i}+e^{2i}\right)\left(e^{-(i\pi)/8}+e^{(i\pi)/8}\right)\right)\right)\right)^6$$

$\cosh(x)$ is the hyperbolic cosine function

$\log_b(x)$ is the base-b logarithm

i is the imaginary unit

27*sqrt(((2(sin(2) cos(π/8) (-0.2618 (cos(2) cos(π/8) - 3.81971*4) log(4 csc(2) sec(π/8) - 0.2618 cot(2)) - 4))-1/5)^6-2*7-φ/2))+1

Input interpretation

$$27\sqrt{\left(\left(2\left(\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)+4\times(-3.81971)\right)\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)\right)-\frac{1}{5}\right)^6-2\times7-\frac{\phi}{2}\right)}+1$$

csc(x) is the cosecant function

sec(x) is the secant function

cot(x) is the cotangent function

log(x) is the natural logarithm

ϕ is the golden ratio

Result

1729.00…

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron.

As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternative representations

$$27\sqrt{\left(\left(2\sin(2)\left(\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\right.\right.\right.\right.\left.\left.\left.\left.\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)\right)-\frac{1}{5}\right)^6-2\times 7-\frac{\phi}{2}\right)+1=1+27\sqrt{\left(-14-\frac{\phi}{2}+\left(2\cosh\left(-\frac{i\,\pi}{8}\right)\cos\left(-2+\frac{\pi}{2}\right)\left(-4-0.2618\left(-15.2788+\cosh(-2\,i)\cosh\left(-\frac{i\,\pi}{8}\right)\right)\right)\log(a)\log_a\left(-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)\right)-\frac{1}{5}\right)^6}$$

$$27\sqrt{\left(\left(2\sin(2)\left(\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\log\left(4\csc(2)\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)\right)-\frac{1}{5}\right)^6-$$
$$2\times 7-\frac{\phi}{2}\Bigg)+1=1+27\sqrt{\left(-14-\frac{\phi}{2}+\left(-\frac{1}{5}+\frac{1}{2i}\,2\cosh\left(-\frac{i\pi}{8}\right)\right)\left(-4-\right.\right.}$$
$$0.2618\left(-15.2788+\cosh(-2i)\cosh\left(-\frac{i\pi}{8}\right)\right)\log(a)\log_a\Big($$
$$\left.\left.-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)\right)\left(-e^{-2i}+e^{2i}\right)\Big)^6\Bigg)$$

$$27\sqrt{\left(\left(2\sin(2)\left(\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)-3.81971\times 4\right)\log\left(4\csc(2)\right.\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\left.\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)\right)-\frac{1}{5}\right)^6-2\times 7-$$
$$\frac{\phi}{2}\Bigg)+1=1+27\sqrt{\left(-14-\frac{\phi}{2}+\left(-\frac{1}{5}+\cos\left(-2+\frac{\pi}{2}\right)\left(e^{-(i\pi)/8}+e^{(i\pi)/8}\right)\right.\right.}$$
$$\left.\left.\left(-4-0.2618\log_e\left(-0.2618\cot(2)+4\csc(2)\sec\left(\frac{\pi}{8}\right)\right)\right.\right.$$
$$\left.\left.\left.\left.\left(-15.2788+\frac{1}{4}\left(e^{-2i}+e^{2i}\right)\left(e^{-(i\pi)/8}+e^{(i\pi)/8}\right)\right)\right)\right)^6\right)$$

$\cosh(x)$ is the hyperbolic cosine function

$\log_b(x)$ is the base-b logarithm

i is the imaginary unit

(27*sqrt(((2(sin(2) cos(π/8) (-0.2618 (cos(2) cos(π/8) - 3.81971*4) log(4 csc(2) sec(π/8) - 0.2618 cot(2)) - 4))-1/5)^6-2*7-φ/2))+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\left(27\sqrt{\left(\left(2\left(\sin(2)\cos\left(\frac{\pi}{8}\right)\left(-0.2618\left(\cos(2)\cos\left(\frac{\pi}{8}\right)+4\times(-3.81971)\right)\log\left(4\csc(2)\right.\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\left.\sec\left(\frac{\pi}{8}\right)-0.2618\cot(2)\right)-4\right)\right)-\frac{1}{5}\right)^6-$$
$$\left.2\times 7-\frac{\phi}{2}\right)+1\Bigg)\,\hat{}\,(1/15)+{C_{\text{MRB}}}^{1-1/(4\pi)+\pi}$$

$\csc(x)$ is the cosecant function

$\sec(x)$ is the secant function

$\cot(x)$ is the cotangent function

$\log(x)$ is the natural logarithm

ϕ is the golden ratio

C_{MRB} is the MRB constant

Result

1.64493800433958364070112366009265587084423608660225364858690907 22

…

1.6449380043395836…. ≈ $\zeta(2) = \pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Now, we analyze the following equation:

$$C = \frac{\text{sen } h}{p'' - 0.2618 \cos h} \cos c$$

$$p'' = \frac{1}{t}$$

We consider:

(((sin(h))/(1/t-0.2618 cos(h))))*cos(c)

Input

$$\frac{\sin(h)}{\frac{1}{t} - 0.2618\cos(h)} \cos(c)$$

Result

$$\frac{\cos(c)\sin(h)}{\frac{1}{t} - 0.2618\cos(h)}$$

Alternate form assuming c, h, and t are real

$$\frac{\cos(c)\sin(h)}{\frac{1}{t} - 0.2618\cos(h)} + 0$$

Alternate forms

$$-\frac{3.81971\, t\cos(c)\sin(h)}{t\cos(h) - 3.81971}$$

$$-\frac{t\cos(c)\sin(h)}{0.2618\, t\cos(h) - 1}$$

$$\frac{(1.90985\, i)\, t\,((-2\, i)\sin(c-h) + (2\, i)\sin(c+h) + 0\, i)}{2\, t\cos(h) - (7.63942 + 0\, i)}$$

Expanded trigonometric form

$$\frac{\cos(c)\sin(h)}{\frac{1}{t} - 0.2618\cos(h)}$$

Reduced trigonometric form

$$\frac{t\,(-1)\sin(c-h) + t\sin(c+h)}{2 - 0.5236\, t\cos(h)}$$

Roots

$$1309\, t\cos(h) - 5000 \neq 0\,, \quad c = \pi n - \frac{\pi}{2}\,, \quad n \in \mathbb{Z}$$

$$-1309\, t - 5000 \neq 0\,, \quad h = 2\pi n + \pi\,, \quad n \in \mathbb{Z}$$

$1309\,t - 5000 \neq 0\,, \quad h = 2\,\pi\,n\,, \quad n \in \mathbb{Z}$

$\mathbb{Z}$ is the set of integers

Root

$t = 0$

Properties as a real function

Domain

$\{t \in \mathbb{R} : t \neq 0 \text{ and } 1309\,t^2\cos(h) - 5000\,t \neq 0\}$

Range

$\{y \in \mathbb{R} :$
$(y = 0 \text{ and } 5000\cos(c)\sin(h) + 1309\,y\cos(h) = 0) \text{ or } (y \neq 0 \text{ and } \sin(h) \neq 0$
$\text{and } \cos(c) \neq 0 \text{ and } 5000\cos(c)\sin(h) + 1309\,y\cos(h) \neq 0)\}$

$\mathbb{R}$ is the set of real numbers

Root for the variable t

$t = 0$

Series expansion at t=0

$t\cos(c)\sin(h) + 0.2618\,t^2\cos(c)\sin(h)\cos(h) + 0.0685392\,t^3\cos(c)\sin(h)\cos^2(h) +$
$0.0179436\,t^4\cos(c)\sin(h)\cos^3(h) + 0.00469763\,t^5\cos(c)\sin(h)\cos^4(h) + O\left(t^6\right)$

(Taylor series)

Series expansion at t=∞

$$-3.81971\,(\cos(c)\tan(h)) - \frac{14.5902\,(\cos(c)\tan(h)\sec(h))}{t} - \frac{55.7303\left(\cos(c)\tan(h)\sec^2(h)\right)}{t^2} - \frac{212.873\left(\cos(c)\tan(h)\sec^3(h)\right)}{t^3} + O\left(\left(\frac{1}{t}\right)^4\right)$$

(Laurent series)

$\sec(x)$ is the secant function

Derivative

$$\frac{\partial}{\partial t}\left(\frac{\sin(h)\cos(c)}{\frac{1}{t}-0.2618\cos(h)}\right)=\frac{14.5902\cos(c)\sin(h)}{(3.81971-t\cos(h))^2}$$

Indefinite integral

$$\int\frac{\cos(c)\sin(h)}{\frac{1}{t}-0.2618\cos(h)}\,dt=$$

$$\cos(c)\tan(h)\,(-14.5902\sec(h)\log(3.81971-t\cos(h))-3.81971\,t)+\text{constant}$$

(assuming a complex-valued logarithm)

$\log(x)$ is the natural logarithm

Limit

$$\lim_{t\to\pm\infty}\frac{\cos(c)\sin(h)}{\frac{1}{t}-0.2618\cos(h)}=-3.81971\cos(c)\tan(h)$$

Alternative representations

$$\frac{\cos(c)\sin(h)}{\frac{1}{t}-0.2618\cos(h)}=\frac{\cosh(c\,i)\cos\left(-h+\frac{\pi}{2}\right)}{-0.2618\cosh(h\,i)+\frac{1}{t}}$$

$$\frac{\cos(c)\sin(h)}{\frac{1}{t}-0.2618\cos(h)}=-\frac{\cosh(-i\,c)\cos\left(h+\frac{\pi}{2}\right)}{-0.2618\cosh(-i\,h)+\frac{1}{t}}$$

$$\frac{\cos(c)\sin(h)}{\frac{1}{t}-0.2618\cos(h)}=\frac{\cosh(-i\,c)\cos\left(-h+\frac{\pi}{2}\right)}{-0.2618\cosh(-i\,h)+\frac{1}{t}}$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations

$$\frac{\cos(c)\sin(h)}{\frac{1}{t}-0.2618\cos(h)} = -\frac{3.81971\,t\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\,c^{2k_1}\,h^{1+2k_2}}{(2k_1)!\,(1+2k_2)!}}{-3.81971+t\sum_{k=0}^{\infty}\frac{(-1)^k h^{2k}}{(2k)!}}$$

$$\frac{\cos(c)\sin(h)}{\frac{1}{t}-0.2618\cos(h)} = -\frac{3.81971\,t\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\,c^{2k_1}\,(h-\frac{\pi}{2})^{2k_2}}{(2k_1)!\,(2k_2)!}}{-3.81971+t\sum_{k=0}^{\infty}\frac{(-1)^k h^{2k}}{(2k)!}}$$

$$\frac{\cos(c)\sin(h)}{\frac{1}{t}-0.2618\cos(h)} = -\frac{3.81971\,t\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_1+k_2}\,h^{1+2k_1}\,(c-\frac{\pi}{2})^{1+2k_2}}{(1+2k_1)!\,(1+2k_2)!}}{3.81971+t\sum_{k=0}^{\infty}\frac{(-1)^k\,(h-\frac{\pi}{2})^{1+2k}}{(1+2k)!}}$$

$n!$ is the factorial function

Integral representations

$$\frac{\cos(c)\sin(h)}{\frac{1}{t}-0.2618\cos(h)} = \frac{(0.53876\,i)\,h\,t\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-h^2/(4s)+s}}{s^{3/2}}\,ds\right)\int_{\frac{\pi}{2}}^{c}\sin(\tau)\,d\tau}{3.81971+t\int_{\frac{\pi}{2}}^{h}\sin(\tau)\,d\tau} \quad \text{for } \gamma>0$$

$$\frac{\cos(c)\sin(h)}{\frac{1}{t}-0.2618\cos(h)} = -\frac{3.81971\,h\,t\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-c^2/(4s)+s}}{\sqrt{s}}\,ds\right)\int_{0}^{1}\cos(h\,\tau)\,d\tau}{-13.5405\,i+t\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-h^2/(4s)+s}}{\sqrt{s}}\,ds} \quad \text{for } \gamma>0$$

$$\frac{\cos(c)\sin(h)}{\frac{1}{t}-0.2618\cos(h)}=\frac{(1.07752\,i)\,t\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{2^{-1+2s}h^{1-2s}\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds\right)\int_{\frac{\pi}{2}}^{c}\sin(\tau)\,d\tau}{3.81971+t\int_{\frac{\pi}{2}}^{h}\sin(\tau)\,d\tau}$$

for $(0<\gamma<1$ and $h>0)$

$\Gamma(x)$ is the gamma function

From the indefinite integral result

$$\int\frac{\cos(c)\sin(h)}{\frac{1}{t}-0.2618\cos(h)}\,dt=$$

$\cos(c)\tan(h)\,(-14.5902\sec(h)\log(3.81971-t\cos(h))-3.81971\,t)$ + constant

(assuming a complex-valued logarithm)

we obtain:

cos(c) (-3.81971 t - 14.5902 log(3.81971 - t cos(h)) sec(h)) tan(h)

Input interpretation

$\cos(c)\,(-3.81971\,t+\log(3.81971-t\cos(h))\sec(h)\times(-14.5902))\tan(h)$

$\log(x)$ is the natural logarithm

$\sec(x)$ is the secant function

Expanded form

$-14.5902\cos(c)\tan(h)\sec(h)\log(3.81971-t\cos(h))-3.81971\,t\cos(c)\tan(h)$

Alternate forms

$-3.81971\cos(c)\tan(h)\,(3.81971\sec(h)\log(3.81971-t\cos(h))+t)$

$\cos(c)\tan(h)\,(-14.5902\sec(h)\log(3.81971-t\cos(h))-3.81971\,t)$

$-\cos(c)\tan(h)\sec(h)\,(14.5902\log(7.63942-2\,t\cos(h))+3.81971\,t\cos(h)-10.1132)$

Property as a real function

Domain

$\{t \in \mathbb{R} : 100000\, t \cos(h) < 381971\}$

$\mathbb{R}$ is the set of real numbers

Roots for the variable t

$t \approx -10.0427 \sec(h)$

$t \approx 3.4102 \sec(h)$

Series expansion at t=0

$$-19.5534\,(\cos(c)\tan(h)\sec(h)) + 4.06206\times 10^{-6}\, t\cos(c)\tan(h) + 0.500001\, t^2\cos(c)\sin(h) + 0.0872668\, t^3\cos(c)\sin(h)\cos(h) + 0.0171348\, t^4\cos(c)\sin(h)\cos^2(h) + O\left(t^5\right)$$

(Taylor series)

Series expansion at t=∞

$$-3.81971\, t\,(\cos(c)\tan(h)) - 14.5902\,(\cos(c)\tan(h)\sec(h)\log(-t\cos(h))) + \frac{55.7303\cos(c)\tan(h)\sec^2(h)}{t} + \frac{106.437\cos(c)\tan(h)\sec^3(h)}{t^2} + O\left(\left(\frac{1}{t}\right)^3\right)$$

(Puiseux series)

Derivative

$$\frac{\partial}{\partial t}(\cos(c)\tan(h)\,(-14.5902\sec(h)\log(3.81971 - t\cos(h)) - 3.81971\, t)) = \cos(c)\tan(h)\left(\frac{14.5902}{3.81971 - t\cos(h)} - 3.81971\right)$$

Indefinite integral

$$\int \cos(c)\,(-3.81971\,t - 14.5902\log(3.81971 - t\cos(h))\sec(h))\tan(h)\,dt = \cos(c)\tan(h)\left(-14.5902\sec^2(h)\,(t\cos(h) - 3.81971)\log(3.81971 - t\cos(h)) + 14.5902\,t\sec(h) - 1.90986\,t^2\right) + \text{constant}$$

(assuming a complex-valued logarithm)

From the indefinite integral result

$$\int \cos(c)\,(-3.81971\,t - 14.5902\log(3.81971 - t\cos(h))\sec(h))\tan(h)\,dt = \cos(c)\tan(h)\left(-14.5902\sec^2(h)\,(t\cos(h) - 3.81971)\log(3.81971 - t\cos(h)) + 14.5902\,t\sec(h) - 1.90986\,t^2\right) + \text{constant}$$

(assuming a complex-valued logarithm)

we obtain:

cos(c) (-1.90986 t^2 + 14.5902 t sec(h) - 14.5902 (-3.81971 + 1 t cos(h)) log(3.81971 - 1 t cos(h)) sec^2(h)) tan(h)

for c = 2, h = 4 and t = 8:

cos(2) (-1.90986 8^2 + 14.5902 8 sec(4) - 14.5902 (-3.81971 + 1 8 cos(4)) log(3.81971 - 1 8 cos(4)) sec^2(4)) tan(4)

Input interpretation

$$\cos(2)\left(-1.90986\times 8^2 + 14.5902\times 8\sec(4) + (-3.81971 + 8\cos(4))\log(3.81971 - 1\times 8\cos(4))\sec^2(4)\times(-14.5902)\right)\tan(4)$$

sec(x) is the secant function

log(x) is the natural logarithm

Result

−183.014156312706264800291860573632697305582963779606765152559072 4

…

-183.0141563127…

Alternative representations

$$\cos(2)\left(8^2(-1)\,1.90986 + 14.5902\times 8\sec(4) - 14.5902\,(-3.81971 + 8\cos(4))\log(3.81971 - 8\cos(4))\sec^2(4)\right)\tan(4) = \frac{1}{2}\left(e^{-2i} + e^{2i}\right)\left(-i + \frac{2i}{1+e^{8i}}\right)\left(-1.90986\times 8^2 + \frac{233.443}{e^{-4i}+e^{4i}} - 14.5902\log\left(3.81971 - 4\left(e^{-4i}+e^{4i}\right)\right)\left(-3.81971 + 4\left(e^{-4i}+e^{4i}\right)\right)\left(\frac{2}{e^{-4i}+e^{4i}}\right)^2\right)$$

$$\cos(2)\left(8^2(-1)\,1.90986 + 14.5902\times 8\sec(4) - 14.5902\,(-3.81971 + 8\cos(4))\log(3.81971 - 8\cos(4))\sec^2(4)\right)\tan(4) = \frac{1}{2}\left(e^{-2i} + e^{2i}\right)\left(-i + \frac{2i}{1+e^{8i}}\right)\left(-1.90986\times 8^2 + \frac{233.443\,e^{4i}}{1+e^{8i}} - 14.5902\log(a)\log_a(3.81971 - 8\cos(4))\left(-3.81971 + 4\left(e^{-4i}+e^{4i}\right)\right)\left(\frac{2\,e^{4i}}{1+e^{8i}}\right)^2\right)$$

$$\cos(2)\left(8^2(-1)\,1.90986 + 14.5902\times 8\sec(4) - 14.5902\,(-3.81971 + 8\cos(4))\log(3.81971 - 8\cos(4))\sec^2(4)\right)\tan(4) = -\frac{1}{2}\cot\left(4 - \frac{\pi}{2}\right)\left(e^{-2i} + e^{2i}\right)\left(-1.90986\times 8^2 + \frac{233.443}{e^{-4i}+e^{4i}} - 14.5902\log(a)\log_a(3.81971 - 8\cos(4))\left(-3.81971 + 4\left(e^{-4i}+e^{4i}\right)\right)\left(\frac{2}{e^{-4i}+e^{4i}}\right)^2\right)$$

i is the imaginary unit

$\log_b(x)$ is the base-b logarithm

$\cot(x)$ is the cotangent function

Series representations

$$\cos(2)\left(8^2(-1)\,1.90986 + 14.5902\times 8\sec(4) - 14.5902\,(-3.81971 + 8\cos(4))\log(3.81971 - 8\cos(4))\sec^2(4)\right)$$
$$\tan(4) = i\left(1 + 2\sum_{k=1}^{\infty}(-1)^k q^{2k}\right)\left(\sum_{k=0}^{\infty}\frac{(-4)^k}{(2k)!}\right)$$
$$\left(-122.231 + 116.722\sum_{k=-\infty}^{\infty}(-1)^k e^{4i(1+2k)}(-1+2\theta(k)) - 116.722\left(\log(2.81971 - 8\cos(4)) - \sum_{k=1}^{\infty}\frac{(-1)^k(2.81971 - 8\cos(4))^{-k}}{k}\right)\left(-0.477464 + \sum_{k=0}^{\infty}\frac{(-16)^k}{(2k)!}\right)\left(\sum_{k=-\infty}^{\infty}(-1)^k e^{4i(1+2k)}(-1+2\theta(k))\right)^2\right) \text{ for } q = e^{4i}$$

$$\cos(2)\left(8^2(-1)\,1.90986 + 14.5902\times 8\sec(4) - 14.5902\,(-3.81971 + 8\cos(4))\log(3.81971 - 8\cos(4))\sec^2(4)\right)\tan(4) =$$
$$i\left(-122.231 + 116.722\sum_{k=-\infty}^{\infty}(-1)^k e^{4i(1+2k)}(-1+2\theta(k)) - 116.722\left(\log(2.81971 - 8\cos(4)) - \sum_{k=1}^{\infty}\frac{(-1)^k(2.81971 - 8\cos(4))^{-k}}{k}\right)\left(-0.477464 + \sum_{k=0}^{\infty}\frac{(-16)^k}{(2k)!}\right)\left(\sum_{k=-\infty}^{\infty}(-1)^k e^{4i(1+2k)}(-1+2\theta(k))\right)^2\right)$$
$$\sum_{k_1=0}^{\infty}\sum_{k_2=-\infty}^{\infty}\frac{(-4)^{k_1}(-1)^{k_2}e^{8ik_2}\operatorname{sgn}(k_2)}{(2k_1)!}$$

$$\cos(2)\left(8^2(-1)\,1.90986 + 14.5902\times 8\sec(4) - 14.5902\,(-3.81971 + 8\cos(4))\log(3.81971 - 8\cos(4))\sec^2(4)\right)\tan(4) =$$
$$i\left(1 + 2\sum_{k=1}^{\infty}(-1)^k q^{2k}\right)\left(J_0(2) + 2\sum_{k=1}^{\infty}(-1)^k J_{2k}(2)\right)$$
$$\left(-122.231 - 233.443\sum_{k=1}^{\infty}(-1)^k q^{-1+2k} - 466.886\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^2\right)$$
$$\left(-0.477464 + J_0(4) + 2\sum_{k=1}^{\infty}(-1)^k J_{2k}(4)\right)\left(\log(2.81971 - 8\cos(4)) - \sum_{k=1}^{\infty}\frac{(-1)^k\,(2.81971 - 8\cos(4))^{-k}}{k}\right) \quad \text{for } q = e^{4i}$$

$n!$ is the factorial function

$\theta(x)$ is the Heaviside step function

$\operatorname{sgn}(x)$ is the sign of x

$J_n(z)$ is the Bessel function of the first kind

From which:

-233/((cos(2) (-1.90986 8^2 + 14.5902 8 sec(4) - 14.5902 (-3.81971 + 1 8 cos(4)) log(3.81971 - 1 8 cos(4)) sec^2(4)) tan(4))+47-8)

Input interpretation

$$-\left(233\Big/\left(\cos(2)\left(-1.90986\times 8^2 + 14.5902\times 8\sec(4) + (-3.81971 + 8\cos(4))\log(3.81971 - 1\times 8\cos(4))\sec^2(4)\times(-14.5902)\right)\tan(4) + 47 - 8\right)\right)$$

$\sec(x)$ is the secant function

$\log(x)$ is the natural logarithm

Result

1.617896503827537811315156736683473814946916575976749727736297 4700

…

1.61789650382753…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternative representations

$$-\left(233 \Big/ \left(\cos(2)\left(8^2(-1)\,1.90986 + 14.5902 \times 8\sec(4) - 14.5902(-3.81971 + 8\cos(4))\log(3.81971 - 8\cos(4))\sec^2(4)\right)\tan(4) + 47 - 8\right)\right) = -\left(233 \Big/ \left(39 + \cosh(-2i)\left(-i + \frac{2i}{1+e^{8i}}\right)\left(-1.90986 \times 8^2 + \frac{233.443}{e^{-4i}+e^{4i}} - 14.5902(-3.81971 + 8\cosh(-4i))\log(a)\log_a(3.81971 - 8\cos(4))\left(\frac{2}{e^{-4i}+e^{4i}}\right)^2\right)\right)\right)$$

$$-\left(233 \Big/ \left(\cos(2)\left(8^2(-1)\,1.90986 + 14.5902 \times 8\sec(4) - 14.5902(-3.81971 + 8\cos(4))\log(3.81971 - 8\cos(4))\sec^2(4)\right)\tan(4) + 47 - 8\right)\right) = -\left(233 \Big/ \left(39 - \frac{1}{2}\cot\left(4 - \frac{\pi}{2}\right)\left(e^{-2i}+e^{2i}\right)\left(-1.90986 \times 8^2 + \frac{233.443}{e^{-4i}+e^{4i}} - 14.5902\log(a)\log_a(3.81971 - 8\cos(4))\left(-3.81971 + 4\left(e^{-4i}+e^{4i}\right)\right)\left(\frac{2}{e^{-4i}+e^{4i}}\right)^2\right)\right)\right)$$

$$-\left(233 \Big/ \left(\cos(2)\left(8^2(-1)\,1.90986 + 14.5902 \times 8\sec(4) - 14.5902(-3.81971 + 8\cos(4))\log(3.81971 - 8\cos(4))\sec^2(4)\right)\tan(4) + 47 - 8\right)\right) = -\left(233 \Big/ \left(39 + \frac{1}{2}\left(e^{-2i}+e^{2i}\right)\left(-i + \frac{2i}{1+e^{8i}}\right)\left(-1.90986 \times 8^2 + \frac{233.443\,e^{4i}}{1+e^{8i}} - 14.5902\log(a)\log_a(3.81971 - 8\cos(4))\left(-3.81971 + 4\left(e^{-4i}+e^{4i}\right)\right)\left(\frac{2\,e^{4i}}{1+e^{8i}}\right)^2\right)\right)\right)$$

$\cosh(x)$ is the hyperbolic cosine function

$\log_b(x)$ is the base-b logarithm

i is the imaginary unit

$\cot(x)$ is the cotangent function

Series representations

$$-\left(233\Big/\left(\cos(2)\left(8^2(-1)\,1.90986 + 14.5902\times 8\sec(4) - 14.5902\,(-3.81971 + 8\cos(4))\log(3.81971 - 8\cos(4))\sec^2(4)\right)\tan(4) + 47 - 8\right)\right) =$$

$$-\left(233\Big/\left(39 + i\left(1 + 2\sum_{k=1}^{\infty}(-1)^k\,q^{2k}\right)\left(\sum_{k=0}^{\infty}\frac{(-4)^k}{(2k)!}\right)\left(-122.231 + 116.722\sum_{k=-\infty}^{\infty}(-1)^k\,e^{4i(1+2k)}\,(-1+2\theta(k)) - 116.722\left(\log(2.81971 - 8\cos(4)) - \sum_{k=1}^{\infty}\frac{(-1)^k\,(2.81971 - 8\cos(4))^{-k}}{k}\right)\left(-0.477464 + \sum_{k=0}^{\infty}\frac{(-16)^k}{(2k)!}\right)\left(\sum_{k=-\infty}^{\infty}(-1)^k\,e^{4i(1+2k)}\,(-1+2\theta(k))\right)^2\right)\right)\right) \text{ for } q = e^{4i}$$

$$-\left(233\Big/\left(\cos(2)\left(8^2(-1)\,1.90986 + 14.5902\times 8\sec(4) - 14.5902\,(-3.81971 + 8\cos(4))\log(3.81971 - 8\cos(4))\sec^2(4)\right)\tan(4) + 47 - 8\right)\right) =$$

$$-\left(233\Big/\left(39 + i\left(1 + 2\sum_{k=1}^{\infty}(-1)^k\,q^{2k}\right)\left(J_0(2) + 2\sum_{k=1}^{\infty}(-1)^k\,J_{2k}(2)\right)\left(-122.231 - 233.443\sum_{k=1}^{\infty}(-1)^k\,q^{-1+2k} - 466.886\left(\sum_{k=1}^{\infty}(-1)^k\,q^{-1+2k}\right)^2\left(-0.477464 + J_0(4) + 2\sum_{k=1}^{\infty}(-1)^k\,J_{2k}(4)\right)\left(\log(2.81971 - 8\cos(4)) - \sum_{k=1}^{\infty}\frac{(-1)^k\,(2.81971 - 8\cos(4))^{-k}}{k}\right)\right)\right)\right) \text{ for } q = e^{4i}$$

$$-\left(233\Big/\left(\cos(2)\left(8^2(-1)\,1.90986+14.5902\times 8\sec(4)-14.5902\left(-3.81971+8\cos(4)\right)\log(3.81971-8\cos(4))\sec^2(4)\right)\tan(4)+47-8\right)\right)=$$
$$-\left(233\Big/\left(39+i\left(J_0(2)+2\sum_{k=1}^{\infty}(-1)^k J_{2k}(2)\right)\left(-122.231-233.443\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}-466.886\left(\sum_{k=1}^{\infty}(-1)^k q^{-1+2k}\right)^2\left(-0.477464+J_0(4)+2\sum_{k=1}^{\infty}(-1)^k J_{2k}(4)\right)\left(\log(2.81971-8\cos(4))-\sum_{k=1}^{\infty}\frac{(-1)^k(2.81971-8\cos(4))^{-k}}{k}\right)\right)\sum_{k=-\infty}^{\infty}(-1)^k e^{8ik}\operatorname{sgn}(k)\right)\right)\quad\text{for } q=e^{4i}$$

$n!$ is the factorial function

$\theta(x)$ is the Heaviside step function

$J_n(z)$ is the Bessel function of the first kind

$\operatorname{sgn}(x)$ is the sign of x

1901-04-24 14:20 Sabina

(Lazio)

Data	1901-04-24 14:20	
	Lat, Lon	42.100, 12.736
	MDP set	► 44 MDPs Imax 8 MCS Spadea et al., 1985d
	Io	8
	Mw	5.25 ± 0.23

4 April 1901 Occultation α Virginis

4 Aprile 1901	**LUNA PIENA** alle 01:20		13°35’

Local Sidereal Time (LST):
14:06:40

8 Aprile 1901	**LUNA NUOVA** alle 21:37		28°08’

Local Sidereal Time (LST):
11:22:12

25 Aprile 1901	**Primo quarto**		2°27’

07:29

11hours 22minutes 12seconds

Input interpretation

11 hours 22 minutes 12 seconds

Results

11.37 hours

---

40 932 seconds

682.2 minutes

Unit conversion

0.4737 days

Offsets from current time

11 hours 22 minutes 12 seconds from now	11:16:27 am CEST | Wednesday, July 3, 2024
11 hours 22 minutes 12 seconds before now	12:32:03 pm CEST | Tuesday, July 2, 2024

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.227×10^{10} km (kilometers)

1.227×10^{13} meters

82 au (astronomical units)

7.625 billion miles

Frequency ν from $\nu = 1/T$:

2.4×10^{-5} Hz (hertz)

11.37°*(3+1/√2)

Input interpretation

11.37° (degrees) $\left(3 + \frac{1}{\sqrt{2}}\right)$

Result

42.15° (degrees)

42.15°

Unit conversions

735.65 mrad (milliradians)

0.73565 radians

---

42 degrees 9 arcminutes
42° 9’

2^{h} 48^{m} 36^{s} (right ascension)

46.833 grads
(unit officially deprecated)

Comparisons as angular elongation

≈ (0.89 to 0.93) × maximum elongation of Venus (45 to 47°)

≈ (1.5 to 2.4) × maximum elongation of Mercury (18 to 28°)

Interpretations

plane angle

angular elongation

Basic unit dimensions

[angle]

Corresponding quantities

Rotation count N from $N = \varphi/(2\pi)$:

0.12 rot (rotations)

Slope percentage from [slope percentage] $= 100\% \times \tan(\theta)$:

91 slope% (slope percent)

Electric loss factor d from $\delta = \tan^{-1}(d)$:

0.91

Quality factor Q from $\delta d = \tan^{-1}(1/Q)$:

1.1

$\tan^{-1}(x)$ is the inverse tangent function

42° 9’ N 11° 37’ E (Mare Tirreno - litorale laziale – Scaglia)

Maree Venezia e Ischia

24.04 = 3h 45m; 16h 25m;

24.04 = 0h 15m; 5h 30m; 12h 30m; 19h 55m

1/2((16 hours 25 minutes)+(12 hours 30 minutes))

Input interpretation

$\frac{1}{2}$ (16 hours 25 minutes + 12 hours 30 minutes)

Results

14 hours 27.5 minutes

14.46 hours

867.5 minutes

Unit conversions

14 hours 27 minutes 30 seconds

14h 27m 30s

42° 9’ N 11° 37’ E (Mare Tirreno - litorale laziale – Scaglia) 14h 27m 30s

New Moon: July 5, 2024, 10.57pm GMT

Pozzuoli Maree 03.07.2024: Low Tide = 01:26 (0.1 m); 14:04 (0.0 m);

High Tide = 07:51 (0.2 m); 20:31 (0.2 m)

Coefficient 70 (high)

Thence, we obtain:

(14 hours 04 minutes)

Input interpretation

14 hours 4 minutes

Results

844 minutes

14.07 hours

Unit conversions

50 640 seconds

50640 seconds = 14.07°

14° 7’

0.5861 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.518×10^{10} km (kilometers)

1.518×10^{13} meters

101 au (astronomical units)

9.433 billion miles

Frequency ν from $\nu = 1/T$:

2×10^{-5} Hz (hertz)

(20 hours 31 minutes)

Input interpretation

20 hours 31 minutes

Results

20.52 hours

1231 minutes

Unit conversions

73 860 seconds

73860 seconds = 20° 51’

20° 51’ 14° 7’

(01 hours 26 minutes)

Input interpretation

1 hour 26 minutes

Results

1.433 hours

86 minutes

Unit conversion

5160 seconds

5160 seconds = 1° 43’

(07 hours 51 minutes)

Input interpretation

7 hours 51 minutes

Results

7.85 hours

471 minutes

Unit conversions

28 260 seconds

28260 seconds = 7° 85’

8° 25’

(20° 51’ - 14° 7’)+(8° 25’ - 1° 43’)

Input interpretation

(20 degrees 51 arcminutes – 14 degrees 7 arcminutes) +
(8 degrees 25 arcminutes – 1 degree 43 arcminutes)

Results

13 degrees 26 arcminutes

13° 26’

3((20° 51’ - 14° 7’)+(8° 25’ - 1° 43’))

Input interpretation

3 ((20 degrees 51 arcminutes – 14 degrees 7 arcminutes) +
(8 degrees 25 arcminutes – 1 degree 43 arcminutes))

Results

40 degrees 18 arcminutes

40° 18’

40° 18’ N 13° 26’ E = (Tyrrhenian Sea - off the Gulf of Naples)

An earthquake of magnitude Md 3.2 occurred in the area: Campi Flegrei, on the day

• 2024-07-03 00:18:44 (UTC) 12 hours, 28 minutes ago

• 03-07-2024 02:18:44 (UTC +02:00) Italian time

with geographical coordinates (lat, lon) **40.8200, 14.1580** at a depth of 3 km.

"**Sopra un cambiamento osservato nelle costanti mareometriche del porto di Trieste**" – *Prof. Giulio Grablovitz*

We analyze the following equation:

$$C = \tfrac{1}{2} \text{ arco tang } \left(\text{sen } 2\ (a + c)\right) : \left(R + \cos 2\ (a + c)\right)$$

We consider:

1/2*atan(((sen 2 (a+c)) / (R + cos 2 (a+c))))

Input

$$\frac{1}{2}\tan^{-1}\left(\frac{\sin(2)\,(a+c)}{R+\cos(2)\,(a+c)}\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Reduced trigonometric form

$$\frac{1}{2}\tan^{-1}\left(\frac{(a+c)\sin(2)}{R+\cos(2)\,a+\cos(2)\,c}\right)$$

Alternate form

$$\frac{1}{4}\,i\log\left(1+\frac{\left(e^{-2i}-e^{2i}\right)(a+c)}{2\left(R+\frac{1}{2}\left(e^{-2i}+e^{2i}\right)(a+c)\right)}\right)-\frac{1}{4}\,i\log\left(1-\frac{\left(e^{-2i}-e^{2i}\right)(a+c)}{2\left(R+\frac{1}{2}\left(e^{-2i}+e^{2i}\right)(a+c)\right)}\right)$$

log(x) is the natural logarithm

Root

$R\neq 0\,,\quad c=-a$

Series expansion at a=0

$$\frac{1}{2}\tan^{-1}\left(\frac{c\sin(2)}{c\cos(2)+R}\right)+\frac{a\,R\sin(2)}{2\left(c^2+2\,c\,R\cos(2)+R^2\right)}-\frac{a^2\left(R\sin(2)\left(c+R\cos(2)\right)\right)}{2\left(c^2+2\,c\,R\cos(2)+R^2\right)^2}+\frac{a^3\,R\sin(2)\left(3\,c^2+6\,c\,R\cos(2)+R^2\left(1+2\cos(4)\right)\right)}{6\left(c^2+2\,c\,R\cos(2)+R^2\right)^3}-\frac{a^4\left(R\sin(2)\left(2\,c^3+6\,c^2\,R\cos(2)+2\,c\,R^2\left(1+2\cos(4)\right)+R^3\left(\cos(2)+\cos(6)\right)\right)\right)}{4\left(c^2+2\,c\,R\cos(2)+R^2\right)^4}+O\left(a^5\right)$$

(Taylor series)

Series expansion at a=∞

$$\left(1-\frac{\pi}{2}\right)+\frac{i\left(-1+e^{4i}\right)e^{-2i}\,R}{4\,a}-\frac{i\left(-1+e^{4i}\right)e^{-4i}\,R\left(2\,e^{2i}\,c+e^{4i}\,R+R\right)}{8\,a^2}+\frac{i\left(-1+e^{4i}\right)e^{-6i}\,R\left(3\,e^{4i}\,c^2+3\left(1+e^{4i}\right)e^{2i}\,c\,R+\left(1+e^{4i}+e^{8i}\right)R^2\right)}{12\,a^3}+O\left(\left(\frac{1}{a}\right)^4\right)$$

(Laurent series)

Derivative

$$\frac{\partial}{\partial a}\left(\frac{1}{2}\tan^{-1}\left(\frac{\sin(2)\,(a+c)}{R+\cos(2)\,(a+c)}\right)\right)=\frac{R\sin(2)}{2\left(2\,R\cos(2)\,(a+c)+(a+c)^2\left(\sin^2(2)+\cos^2(2)\right)+R^2\right)}$$

Indefinite integral

$$\int \frac{1}{2}\tan^{-1}\left(\frac{\sin(2)\,(a+c)}{R+\cos(2)\,(a+c)}\right)da = \frac{1}{2}a\tan^{-1}\left(\frac{\sin(2)\,(a+c)}{\cos(2)\,(a+c)+R}\right) - \frac{1}{4}\sin(2)\left(R\log\left(a^2+2a\,(c+R\cos(2))+c^2+2c\,R\cos(2)+R^2\right) - \tan^{-1}\left(\frac{\tan(1)\,(a+c-R)}{a+c+R}\right)(c\csc(2)+R\,(\cot(2)+i)) + (c\csc(2)+R\,(\cot(2)+-i))\tan^{-1}\left(\frac{R\sin(2)}{a+c+R\cos(2)}\right)\right) + \text{constant}$$

$\cot(x)$ is the cotangent function

$\csc(x)$ is the cosecant function

Limit

$$\lim_{R\to\pm\infty}\frac{1}{2}\tan^{-1}\left(\frac{(a+c)\sin(2)}{R+(a+c)\cos(2)}\right) = 0$$

From the reduced trigonometric form

$$\frac{1}{2}\tan^{-1}\left(\frac{(a+c)\sin(2)}{R+\cos(2)\,a+\cos(2)\,c}\right)$$

we obtain:

1/2 tan^(-1)(((a + c) sin(2))/(R + cos(2) a + cos(2) c))

Input

$$\frac{1}{2}\tan^{-1}\left(\frac{(a+c)\sin(2)}{R+\cos(2)\,a+\cos(2)\,c}\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Alternate forms

$$\frac{1}{2}\tan^{-1}\left(\frac{\sin(2)\,(a+c)}{\cos(2)\,(a+c)+R}\right)$$

$$\frac{1}{4}\,i\log\left(1+\frac{\left(e^{-2i}-e^{2i}\right)(a+c)}{2\left(\frac{1}{2}\left(e^{-2i}+e^{2i}\right)a+\frac{1}{2}\left(e^{-2i}+e^{2i}\right)c+R\right)}\right)-$$
$$\frac{1}{4}\,i\log\left(1-\frac{\left(e^{-2i}-e^{2i}\right)(a+c)}{2\left(\frac{1}{2}\left(e^{-2i}+e^{2i}\right)a+\frac{1}{2}\left(e^{-2i}+e^{2i}\right)c+R\right)}\right)$$

From the alternate form

$$\frac{1}{2}\tan^{-1}\left(\frac{\sin(2)\,(a+c)}{\cos(2)\,(a+c)+R}\right)$$

1/2 tan^(-1)(((a + c) sin(2))/(R + (a + c) cos(2)))

for a = 2, c =4 and R = 8:

1/2 tan^(-1)(((2 + 4) sin(2))/(8 + (2 + 4) cos(2)))

Input

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Exact Result

$$\frac{1}{2}\tan^{-1}\left(\frac{6\sin(2)}{8+6\cos(2)}\right)$$

(result in radians)

Decimal approximation

0.390539462115047153381955747858460759466484800163284311920652285 4…

(result in radians)

0.390539462115….

Alternate forms

$$\frac{1}{2}\tan^{-1}\left(\frac{3\sin(2)}{4+3\cos(2)}\right)$$

$$\frac{1}{4}i\log\left(1+\frac{3\left(e^{-2i}-e^{2i}\right)}{8+3\left(e^{-2i}+e^{2i}\right)}\right)-\frac{1}{4}i\log\left(1-\frac{3\left(e^{-2i}-e^{2i}\right)}{8+3\left(e^{-2i}+e^{2i}\right)}\right)$$

$\log(x)$ is the natural logarithm

Alternative representations

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right)=\frac{1}{2}\tan^{-1}\left(1,\frac{6\sin(2)}{8+6\cos(2)}\right)$$

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right)=\frac{1}{2}\tan^{-1}\left(\frac{6\cos\left(-2+\frac{\pi}{2}\right)}{8+6\cosh(-2i)}\right)$$

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right)=\frac{1}{4}i\left(\log\left(1-\frac{6i\sin(2)}{8+6\cos(2)}\right)-\log\left(1+\frac{6i\sin(2)}{8+6\cos(2)}\right)\right)$$

$\tan^{-1}(x, y)$ is the inverse tangent function

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right)=\frac{1}{2}\sum_{k=0}^{\infty}\frac{(-1)^k\,6^{1+2k}\,((8+6\cos(2))\csc(2))^{-1-2k}}{1+2k}$$

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right)=\frac{1}{2}\tan^{-1}\left(\frac{3\sum_{k=0}^{\infty}\frac{(-1)^k\,2^{1+2k}}{(1+2k)!}}{4+3\sum_{k=0}^{\infty}\frac{(-4)^k}{(2k)!}}\right)$$

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right) = \frac{1}{2}\tan^{-1}(z_0) + \frac{1}{4}i\sum_{k=1}^{\infty}\frac{\left(-(-i-z_0)^{-k}+(i-z_0)^{-k}\right)\left(\frac{3\sin(2)}{4+3\cos(2)}-z_0\right)^k}{k}$$

for $(i\,z_0 \notin \mathbb{R}$ or $((\text{not } 1 \le i\,z_0 < \infty)$ and $(\text{not } -\infty < i\,z_0 \le -1)))$

$\csc(x)$ is the cosecant function

$n!$ is the factorial function

$\mathbb{R}$ is the set of real numbers

Integral representations

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right) = \frac{3\sin(2)}{8+6\cos(2)}\int_0^1 \frac{1}{1+\frac{9t^2\sin^2(2)}{(4+3\cos(2))^2}}\,dt$$

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right) = -\frac{3i\sin(2)}{\pi^{3/2}(32+24\cos(2))}\int_{-i\infty+\gamma}^{i\infty+\gamma}(4+3\cos(2))^{2s}(25+24\cos(2))^{-s}\,\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)^2\,ds \quad \text{for } 0<\gamma<\frac{1}{2}$$

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right) = -\frac{3i\sin(2)}{32\pi+24\pi\cos(2)}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{9^{-s}\left((4+3\cos(2))\csc(2)\right)^{2s}\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds \quad \text{for } 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representations

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right)=$$

$$\frac{3\sin(2)}{(8+6\cos(2))\left(1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{9k^2\sin^2(2)}{(4+3\cos(2))^2}}{1+2k}\right)}=(3\sin(2))\Big/\left(\begin{array}{l}(8+6\cos(2))\\ \left(1+\left(9\sin^2(2)\right)\Big/\left((4+3\cos(2))^2\left(3+\left(36\sin^2(2)\right)\Big/\left((4+3\cos(2))^2\right.\right.\right.\right.\\ \left.\left.\left.\left.\left(5+\frac{81\sin^2(2)}{(4+3\cos(2))^2\left(7+\frac{144\sin^2(2)}{(9+\ldots)\,(4+3\cos(2))^2}\right)}\right)\right)\right)\right)\end{array}\right)$$

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right)=$$

$$\frac{1}{2}\left(\frac{6\sin(2)}{8+6\cos(2)}-\frac{216\sin^3(2)}{(8+6\cos(2))^3\left(3+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{36\left(1+(-1)^{1+k}+k\right)^2\sin^2(2)}{(8+6\cos(2))^2}}{3+2k}\right)}\right)=$$

$$\frac{1}{2}\left(\frac{6\sin(2)}{8+6\cos(2)}-\left(216\sin^3(2)\right)\Big/\left((8+6\cos(2))^3\left(3+\left(324\sin^2(2)\right)\Big/\left((8+6\cos(2))^2\left(5+\left(144\sin^2(2)\right)\Big/\left((8+6\cos(2))^2\left(7+\frac{900\sin^2(2)}{(8+6\cos(2))^2\left(9+\frac{576\sin^2(2)}{(11+\ldots)(8+6\cos(2))^2}\right)}\right)\right)\right)\right)\right)\right)$$

)))))))

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right)=$$

$$\frac{3\sin(2)}{(8+6\cos(2))\left(1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{36(-1+2k)^2\sin^2(2)}{(8+6\cos(2))^2}}{1+2k-\frac{36(-1+2k)\sin^2(2)}{(8+6\cos(2))^2}}\right)}=(3\sin(2))\Big/\left((8+6\cos(2))\left(1+\left(36\sin^2(2)\right)\Big/\left((8+6\cos(2))^2\left(3-\frac{36\sin^2(2)}{(8+6\cos(2))^2}+\left(324\sin^2(2)\right)\Big/\left((8+6\cos(2))^2\left(5-\frac{108\sin^2(2)}{(8+6\cos(2))^2}+\left(900\sin^2(2)\right)\Big/\left((8+6\cos(2))^2\left(7-\frac{180\sin^2(2)}{(8+6\cos(2))^2}+\frac{1764\sin^2(2)}{(8+6\cos(2))^2\left(9+\ldots-\frac{252\sin^2(2)}{(8+6\cos(2))^2}\right)}\right)\right)\right)\right)\right)\right)\right)$$

$$\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right)=$$

$$\frac{3\sin(2)}{(8+6\cos(2))\left(1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{72\left(1-2\left\lfloor\frac{1+k}{2}\right\rfloor\right)\left\lfloor\frac{1+k}{2}\right\rfloor\sin^2(2)}{(8+6\cos(2))^2}}{(1+2k)\left(1+\frac{18\left(1+(-1)^k\right)\sin^2(2)}{(8+6\cos(2))^2}\right)}+\frac{36\sin^2(2)}{(8+6\cos(2))^2}\right)}=$$

$$(3\sin(2))\Big/\Bigg((8+6\cos(2))\left(1+-\left(\left(72\sin^2(2)\right)\Big/\left((8+6\cos(2))^2\left(3-\left(72\sin^2(2)\right)\Big/\left((8+6\cos(2))^2\left(5\left(1+\frac{36\sin^2(2)}{(8+6\cos(2))^2}\right)-\left(432\sin^2(2)\right)\Big/\left((8+6\cos(2))^2\left(7-\left(432\sin^2(2)\right)\Big/\left((8+6\cos(2))^2\left(9\left(1+\frac{36\sin^2(2)}{(8+6\cos(2))^2}\right)+\cdots\right)\right)\right)\right)\right)\right)\right)\right)\Bigg)$$

$\underset{k=k_1}{\overset{k_2}{\mathrm{K}}} a_k/b_k$ is a continued fraction

$\lfloor x \rfloor$ is the floor function

From which:

1+1/((4((1/2 tan^(-1)(((2 + 4) sin(2))/(8 + (2 + 4) cos(2)))))))+4(MRB const)^(1-1/(4π)+π)

Input

$$1+\frac{1}{4\left(\frac{1}{2}\tan^{-1}\left(\frac{(2+4)\sin(2)}{8+(2+4)\cos(2)}\right)\right)}+4\,C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

$\tan^{-1}(x)$ is the inverse tangent function

C_{MRB} is the MRB constant

Exact Result

$$4\,C_{\text{MRB}}{}^{1-1/(4\pi)+\pi} + 1 + \frac{1}{2\tan^{-1}\left(\frac{6\sin(2)}{8+6\cos(2)}\right)}$$

(result in radians)

Decimal approximation

1.64463135749214572844322450676280399997026042803144617606191279 12

…

(result in radians)

1.64463135749…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$4\,C_{\text{MRB}}{}^{1-1/(4\pi)+\pi} + 1 + \frac{1}{2\tan^{-1}\left(\frac{3\sin(2)}{4+3\cos(2)}\right)}$$

$$4\,C_{\text{MRB}}{}^{1-1/(4\pi)+\pi} + \frac{1 + 2\tan^{-1}\left(\frac{6\sin(2)}{8+6\cos(2)}\right)}{2\tan^{-1}\left(\frac{6\sin(2)}{8+6\cos(2)}\right)}$$

$$\frac{8\tan^{-1}\left(\frac{3\sin(2)}{4+3\cos(2)}\right)C_{\text{MRB}}{}^{1-1/(4\pi)+\pi} + 1 + 2\tan^{-1}\left(\frac{3\sin(2)}{4+3\cos(2)}\right)}{2\tan^{-1}\left(\frac{3\sin(2)}{4+3\cos(2)}\right)}$$

Now, we analyze the following equation:

$$C\ 1869 = \tfrac{1}{2}\ \text{arco tang}\ \frac{\text{sen}\ 2\ (6^h - 9'3)}{1.745 + \cos\ 2\ (6^h - 9'3)} = 3^o\,6' = +\,12'4$$

1/2* atan(((sin 2(6 hours – 9.3 minutes))/(1.745 + cos 2(6 hours – 9.3 minutes))))

Input interpretation

$$\frac{1}{2}\tan^{-1}\left(\frac{\sin(2)\,(6\ \text{hours} - 9.3\ \text{minutes})}{1.745 + \cos(2)\,(6\ \text{hours} - 9.3\ \text{minutes})}\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Result

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\ \text{minutes}}{-145.94\ \text{minutes} + 1.745}\right)$$

1/2 tan^(-1)((318.89 minutes)/(-145.94 minutes + 1.745))

Input

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89 \times \frac{\pi}{10\,800}}{-145.94 \times \frac{\pi}{10\,800} + 1.745}\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Result

0.027215012220275147816926875605294000314914891862403128111550257 1

…

(result in radians)

0.02721501222….

Alternative representations

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\,\pi}{10\,800\left(-\frac{145.94\,\pi}{10\,800}+1.745\right)}\right)=\frac{1}{2}\,\mathrm{sc}^{-1}\left(\frac{0.029527\,\pi}{1.745-0.013513\,\pi}\,\middle|\,0\right)$$

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\,\pi}{10\,800\left(-\frac{145.94\,\pi}{10\,800}+1.745\right)}\right)=\frac{1}{2}\tan^{-1}\left(1,\,\frac{0.029527\,\pi}{1.745-0.013513\,\pi}\right)$$

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\,\pi}{10\,800\left(-\frac{145.94\,\pi}{10\,800}+1.745\right)}\right)=\frac{1}{2}\,i\tanh^{-1}\left(-\frac{0.029527\,i\,\pi}{1.745-0.013513\,\pi}\right)$$

$\mathrm{sc}^{-1}(x\mid m)$ is the inverse of the Jacobi elliptic function sc

$\tan^{-1}(x, y)$ is the inverse tangent function

$\tanh^{-1}(x)$ is the inverse hyperbolic tangent function

i is the imaginary unit

Series representations

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\,\pi}{10\,800\left(-\frac{145.94\,\pi}{10\,800}+1.745\right)}\right)=0.014763$$
$$\sum_{k=0}^{\infty}\frac{(-0.0002180)^k\,T_{1+2k}\left(\frac{\pi}{1.745-0.013513\,\pi}\right)\,{}_2F_1\left(\frac{1}{2}+k,\,1+k;\,2+2k;\,-0.0008718\right)}{1+2k}$$

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\,\pi}{10\,800\left(-\frac{145.94\,\pi}{10\,800}+1.745\right)}\right)=$$
$$\frac{1}{-129.135+\pi}\,1.09254\,\pi\sum_{k=0}^{\infty}\frac{1}{1+2k}\,(-0.0002180)^k\,T_{2k}\left(\frac{\pi}{1.745-0.013513\,\pi}\right)$$
$${}_3F_2\left(\frac{1}{2}+k,\,\frac{1}{2}+k,\,1+k;\,\frac{3}{2}+k,\,1+2k;\,-0.0008718\right)(-2+\delta_k)$$

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\,\pi}{10800\left(-\frac{145.94\,\pi}{10800}+1.745\right)}\right)=$$

$$\frac{1}{2}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{5}\right)^k 0.05905^{1+2k}\,F_{1+2k}\left(\frac{\pi}{(1.745-0.013513\,\pi)\left(1+\sqrt{1+\frac{0.0006975\,\pi^2}{(1.745-0.013513\,\pi)^2}}\right)}\right)^{1+2k}}{1+2k}$$

$T_n(x)$ is the Chebyshev polynomial of the first kind

${}_pF_q(a_1,\ldots,a_p;b_1,\ldots,b_q;z)$ is the generalized hypergeometric function

δ_{n_1,n_2} is the Kronecker delta function

F_n is the n^{th} Fibonacci number

Integral representations

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\,\pi}{10800\left(-\frac{145.94\,\pi}{10800}+1.745\right)}\right)=\frac{0.014763\,\pi}{1.745-0.013513\,\pi}\int_0^1\frac{1}{1+\frac{0.0008718\,\pi^2\,t^2}{(1.745-0.013513\,\pi)^2}}\,dt$$

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\,\pi}{10800\left(-\frac{145.94\,\pi}{10800}+1.745\right)}\right)=-\frac{0.003691\,i}{(1.745-0.013513\,\pi)\sqrt{\pi}}\int_{-i\infty+\gamma}^{i\infty+\gamma}\left(1+\frac{0.0008718\,\pi^2}{(1.745-0.013513\,\pi)^2}\right)^{-s}\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)^2\,ds\quad\text{for } 0<\gamma<\frac{1}{2}$$

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\,\pi}{10800\left(-\frac{145.94\,\pi}{10800}+1.745\right)}\right)=-\frac{0.273135}{i\,(-129.135+\pi)}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{7.0449\,s}\left(\frac{\pi^2}{(1.745-0.013513\,\pi)^2}\right)^{-s}\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds\quad\text{for } 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representations

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\,\pi}{10800\left(-\frac{145.94\,\pi}{10800}+1.745\right)}\right)=\frac{0.014763\,\pi}{(1.745-0.013513\,\pi)\left(1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{0.0008718\,k^2\,\pi^2}{(1.745-0.013513\,\pi)^2}}{1+2k}\right)}=\cfrac{0.0272419}{1+\cfrac{0.00296849}{3+\cfrac{0.011874}{5+\cfrac{0.0267164}{7+\cfrac{0.0474958}{9+\ldots}}}}}$$

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\,\pi}{10800\left(-\frac{145.94\,\pi}{10800}+1.745\right)}\right)=\frac{0.014763\,\pi}{1.745-0.013513\,\pi}-\frac{0.00001287\,\pi^3}{(1.745-0.013513\,\pi)^3\left(3+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{0.0008718\left(1+(-1)^{1+k}+k\right)^2\,\pi^2}{(1.745-0.013513\,\pi)^2}}{3+2k}\right)}=$$

$$0.0272419-\cfrac{0.0000808673}{3+\cfrac{0.0267164}{5+\cfrac{0.011874}{7+\cfrac{0.0742122}{9+\cfrac{0.0474958}{11+\ldots}}}}}$$

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\,\pi}{10800\left(-\frac{145.94\,\pi}{10800}+1.745\right)}\right)=\frac{0.014763\,\pi}{(1.745-0.013513\,\pi)\left(1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{0.0008718\,(\pi-2\,k\,\pi)^2}{(1.745-0.013513\,\pi)^2}}{1+2k-\frac{0.0008718\,(-1+2\,k)\,\pi^2}{(1.745-0.013513\,\pi)^2}}\right)}=$$

$$\cfrac{0.0272419}{1+\cfrac{0.00296849}{2.99703+\cfrac{0.0267164}{4.99109+\cfrac{0.0742122}{6.98516+\cfrac{0.145456}{8.97922+\ldots}}}}}$$

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\,\pi}{10800\left(-\frac{145.94\,\pi}{10800}+1.745\right)}\right)=$$
$$\frac{0.014763\,\pi}{(1.745-0.013513\,\pi)\left(1+\frac{0.0008718\,\pi^2}{(1.745-0.013513\,\pi)^2}+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{0.001744\,\pi^2\left(1-2\left\lfloor\frac{1+k}{2}\right\rfloor\right)\left\lfloor\frac{1+k}{2}\right\rfloor}{(1.745-0.013513\,\pi)^2}}{(1+2k)\left(1+\frac{0.0004359\left(1+(-1)^k\right)\pi^2}{(1.745-0.013513\,\pi)^2}\right)}\right)}=$$
$$\frac{0.0272419}{1.00297+-\frac{0.00593698}{3-\frac{0.00593698}{5.01484-\frac{0.0356219}{7-\frac{0.0356219}{9.02672+\ldots}}}}}$$

$\underset{k=k_1}{\overset{k_2}{\mathrm{K}}}\,a_k/b_k$ is a continued fraction

$\lfloor x\rfloor$ is the floor function

1/2* atan(((sin 2(6 hours 3.2 minutes))/(1.745 + cos 2(6 hours 3.2 minutes))))

Input interpretation

$$\frac{1}{2}\tan^{-1}\left(\frac{\sin(2)\,(6\text{ hours }\ \ 3.2\text{ minutes})}{1.745+\cos(2)\,(6\text{ hours }\ \ 3.2\text{ minutes})}\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Result

$$\frac{1}{2}\tan^{-1}\left(\frac{330.3\text{ minutes}}{-151.1\text{ minutes}+1.745}\right)$$

1/2 tan^(-1)((330.3 minutes)/(-151.1 minutes + 1.745))

Input

$$\frac{1}{2}\tan^{-1}\left(\frac{330.3\times\frac{\pi}{10800}}{-151.1\times\frac{\pi}{10800}+1.745}\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Result

0.028211567901713365901409632969355610540162870089643269857598463 9

…

(result in radians)

0.0282115679….

1/2 tan^(-1)((318.89 minutes)/(-145.94 minutes + 1.745))+1/2 tan^(-1)((330.3 minutes)/(-151.1 minutes + 1.745))

Input

$$\frac{1}{2}\tan^{-1}\left(\frac{318.89\times\frac{\pi}{10\,800}}{-145.94\times\frac{\pi}{10\,800}+1.745}\right)+\frac{1}{2}\tan^{-1}\left(\frac{330.3\times\frac{\pi}{10\,800}}{-151.1\times\frac{\pi}{10\,800}+1.745}\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Result

0.055426580121988513718336508574649610855077761952046397969148721 1

…

(result in radians)

0.05542658….

We obtain also:

(29+1/√2)*1/((1/((1/2 tan^(-1)((318.89 minutes)/(-145.94 minutes + 1.745))+1/2 tan^(-1)((330.3 minutes)/(-151.1 minutes + 1.745))))))

Input

$$\left(29+\frac{1}{\sqrt{2}}\right)\times\frac{1}{\frac{1}{\frac{1}{2}\tan^{-1}\left(\frac{318.89\times\frac{\pi}{10\,800}}{-145.94\times\frac{\pi}{10\,800}+1.745}\right)+\frac{1}{2}\tan^{-1}\left(\frac{330.3\times\frac{\pi}{10\,800}}{-151.1\times\frac{\pi}{10\,800}+1.745}\right)}}$$

$\tan^{-1}(x)$ is the inverse tangent function

Result

1.64656333419990447439386802526108560003468677027575041145402966 13

…

(result in radians)

1.6465633341999…. ≈ $\zeta(2) = \pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

From the above result:

0.055426580121988513718336508574649610855077761952046397691 radians

Input interpretation

0.055426580121988513718336508574649610855077761952046397969 radians

Unit conversions

55.426580121988513718336508574649610855077761952046397969 mrad (milliradians)

3.17570911383364528979794965349634055476495692166664055 5° (degrees)

---

3 degrees 10 arcminutes

32.552809801123043272618752586825997153844917999905998 arcseconds

---

12 ^{m} 42.170187320074869551507916839121733143589661199993733 2 ^{s} (right ascension)

0.035285656820373836553310551705514895052943965796296006166 6 quad (quadrants)

Comparisons as plane angle

≈ (0.14 ≈ 1/7) × tilt of the earth's axis relative to its orbital plane (23.45°)

Comparison as angular elongation

≈ (0.11 to 0.18) × maximum elongation of Mercury (18 to 28°)

Interpretations

plane angle

angular elongation

Basic unit dimensions

[angle]

Corresponding quantities

Arc length s along the Earth's equator from $s = R\theta$:

354 km (kilometers)

353 518 meters

191 nmi (nautical miles)

220 miles

Arc length s around the Earth at 45° latitude from $s = R\cos(45°)\theta$:

250 km (kilometers)

249 975 meters

135 nmi (nautical miles)

155 miles

Rotation count N from $N = \varphi/(2\pi)$:

0.0088 rot (rotations)

Slope percentage from [slope percentage] = 100% × tan(θ):

5.5 slope% (slope percent)

Electric loss factor d from $\delta = \tan^{-1}(d)$:

0.055

Quality factor Q from $\delta d = \tan^{-1}(1/Q)$:

18

$\tan^{-1}(x)$ is the inverse tangent function

evidenza. — A tale scopo impiego la curva tracciata dal mareografo nella giornata del 30 Gennaio 1872 e riprodotta nella memoria del prof cav. Alessandro Betocchi, intitolata: „Dei mareografi esistenti in Italia ecc.“ e ne rilevo le seguenti altezze espresse in centimetri:

Quadro M	Ore lunisolari	0^h	1^h	2^h	3^h	4^h	5^h	6^h	7^h	8^h	9^h	10^h	11^h
	Antimeridiane	147	157	158	153	143	133	126	123	125	132	140	149
	Pomeridiane	156	156	149	135	120	106	98	97	101	110	122	135
	Somma	303	313	307	288	263	239	224	220	226	242	262	284

Si osserverà che le ore impiegate non sono solari, né lunari, ma luni-solari; sotto tale denominazione intendo la 24ma parte di una giornata lunisolare, che all'epoca delle sizigie dura in media 24h 36′ ed alle quadrature 25h 45′ in causa delle variazioni della correzione semimensuale; nel giorno a cui s'estendono le citate osservazioni la durata della giornata lunare era di 24h 44', da cui detratti 8′ per la variazione della detta correzione (l'ora del passaggio al meridiano essendo = 3h 31′ ant.) si ha 24h 36′ quale durata della giornata luni-solare, la cui 24ma parte è = 1h 1′ 30′.

I dati esposti presentano i seguenti estremi:

a)	Alta marea	(M_1) =	1h 40′ ant.	Cm.	158·5
	Bassa „	(m_1) =	7h 6′ „	„	122·7
	Alta „	(M_2) =	0h 30′ pom.	„	156·9
	Bassa „	(m_2) =	6h 42′ „	„	96·6
	Media alta marea	=	1h 5′	Cm.	157·7
	„ bassa „	=	6h 54′	„	109·6
	Durata del flusso	=	6h 11′ luni-solari.		
	„ „ riflusso	=	5h 49′ „ „		
	Differenza		0h 22′		

01.30.1872 12h 30m 156.9 cm (high tide)

14.05.1872 17h 45m Cividale del Friuli 4.4 M

15.05 Moon First quarter 17h 6m; 06.06.1872 Annular Eclipse of the Sun 4h 23m

(17 hours 6 minutes)

Input interpretation

17 hours 6 minutes

Results

1026 minutes

17.1 hours

Unit conversions

61 560 seconds

61560 seconds = 17° 1’

17° 1’(2+1/√2)

Input interpretation

(17 degrees 1 arcminute) $\left(2+\frac{1}{\sqrt{2}}\right)$

Results

46 degrees 3.956 arcminutes

46.07° (degrees)

Unit conversions

804 mrad (milliradians)

0.804 radians

---

46 degrees 3 arcminutes 57.36 arcseconds

46° 3’

46° 3’ N 17° 1’ E (Croazia – 271 Km da Cividale del Friuli)

08.10.1872 13h 25m Cosentino 4.72 M

08.10 Luna vicina al Primo quarto 12h 30m ;

30.11.1872 Eclisse Totale di Sole 19h 26m

(12 hours 30 minutes)

Input interpretation

12 hours 30 minutes

Results

12.5 hours

750 minutes

Unit conversions

45 000 seconds

45000 seconds = 12° 5’

(2+euler mascheroni const+1/√2)(12° 5')

Input interpretation

$$\left(2+\gamma+\frac{1}{\sqrt{2}}\right)(12 \text{ degrees } 5 \text{ arcminutes})$$

γ is the Euler-Mascheroni constant

Results

39 degrees 41.13 arcminutes

39.69° (degrees)

39° 69’

Unit conversions

692.6 mrad (milliradians)

0.6926 radians

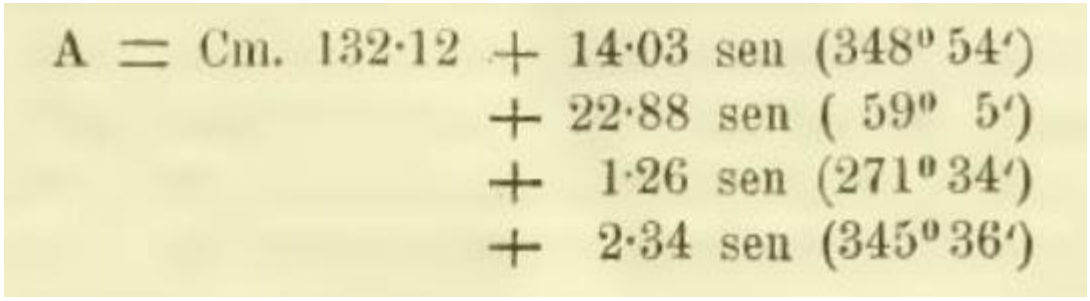
---

39 degrees 41 arcminutes 8.026 arcseconds

39° 41’

39° 41’ N 12° 5’ E (Mar Tirreno meridionale)

Now, we analyze the following formula:


A = Cm. 132·12 + 14·03 sen (348° 54′)
+ 22·88 sen (59° 5′)
+ 1·26 sen (271° 34′)
+ 2·34 sen (345° 36′)

132.12 + 14.03 sin(348° 54’) + 132.12 + 22.88 sin(59° 5’) + 132.12 + 1.26 sin(271° 34’) + 2.34 sin(345° 36’)

Input interpretation

132.12 + 14.03 sin(348 degrees 54 arcminutes) +
132.12 + 22.88 sin(59 degrees 5 arcminutes) + 132.12 +
1.26 sin(271 degrees 34 arcminutes) + 2.34 sin(345 degrees 36 arcminutes)

Result

411.4

411.4

From which, we obtain:

10((132.12 + 14.03 sin(348° 54') + 132.12 + 22.88 sin(59° 5') + 132.12 + 1.26 sin(271° 34') + 2.34 sin(345° 36')))-18

Input interpretation

10 (132.12 + 14.03 sin(348 degrees 54 arcminutes) +
132.12 + 22.88 sin(59 degrees 5 arcminutes) +
132.12 + 1.26 sin(271 degrees 34 arcminutes) +
2.34 sin(345 degrees 36 arcminutes)) – 18

Result

4096

4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality.

The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

27*sqrt((10((132.12 + 14.03 sin(348° 54') + 132.12 + 22.88 sin(59° 5') + 132.12 + 1.26 sin(271° 34') + 2.34 sin(345° 36')))-18))+1

Input interpretation

$$27\sqrt{(10(132.12 + 14.03\sin(348 \text{ degrees } 54 \text{ arcminutes}) + 132.12 + 22.88\sin(59 \text{ degrees } 5 \text{ arcminutes}) + 132.12 + 1.26\sin(271 \text{ degrees } 34 \text{ arcminutes}) + 2.34\sin(345 \text{ degrees } 36 \text{ arcminutes})) - 18) + 1}$$

Result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string.

Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

((27*sqrt((10((132.12 + 14.03 sin(348° 54’) + 132.12 + 22.88 sin(59° 5’) + 132.12 + 1.26 sin(271° 34’) + 2.34 sin(345° 36’)))-18))+1))^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$(27\sqrt{(10\,(132.12 + 14.03\sin(348\text{ degrees }\ 54\text{ arcminutes}) + 132.12 + 22.88\sin(59\text{ degrees }\ 5\text{ arcminutes}) + 132.12 + 1.26\sin(271\text{ degrees }\ 34\text{ arcminutes}) + 2.34\sin(345\text{ degrees }\ 36\text{ arcminutes})) - 18) + 1)}\,\hat{}\,(1/15) + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.645

1.645 ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

We analyze the following formula

$$C = \left(2 - \frac{h}{6-t}\right) \frac{h}{6-t} t;$$

(2-h/(6-t))*((h)/(6-t))*t

Input

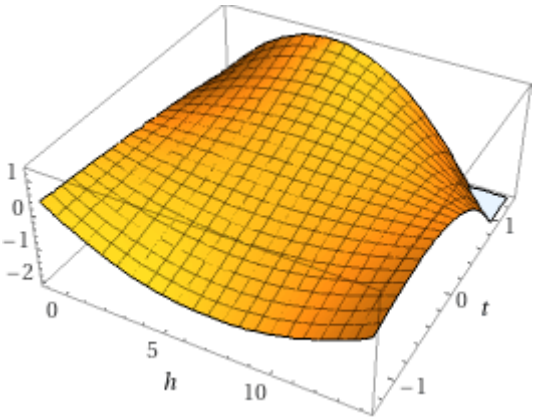
$$\left(2 - \frac{h}{6-t}\right) \times \frac{h}{6-t} t$$

Result

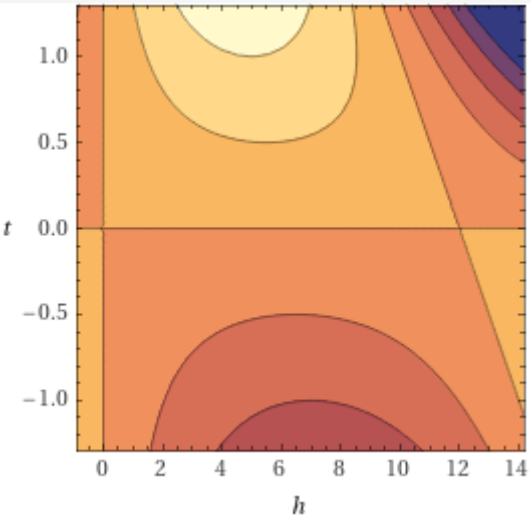
$$\frac{h\,t\left(2 - \frac{h}{6-t}\right)}{6-t}$$

3D plot **(figure that can be related to a D-brane/Instanton)**

The key observation from the below plots and is that at $h = 1$, which is taken as the energy density of the universe at the Big Bang, with $t = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.



Contour plot



Alternate forms

$$\frac{h\,t\,(-h-2\,t+12)}{(6-t)^2}$$

$$-\frac{h\,t\,(h+2\,t-12)}{(t-6)^2}$$

$$-\frac{h\,t\,(h+2\,(t-6))}{(t-6)^2}$$

Expanded forms

$$\frac{2\,h\,t}{6-t}-\frac{h^2\,t}{t^2-12\,t+36}$$

$$\frac{h^2\,(-t)-2\,h\,t^2+12\,h\,t}{t^2-12\,t+36}$$

$$\frac{2\,h\,t}{6-t}-\frac{h^2\,t}{(6-t)^2}$$

Roots

$h=0\,,\quad t-6\neq 0$

$t=\frac{12-h}{2}\,,\quad h\neq 0$

Root

$t=0$

Integer roots

$h=2\,n\,,\quad t=6-n\,,\quad n\in\mathbb{Z}\,,\quad n\leq -1$

$h=2\,n\,,\quad t=6-n\,,\quad n\in\mathbb{Z}\,,\quad n\geq 1$

$\mathbb{Z}$ is the set of integers

Properties as a real function

Domain

$\{t \in \mathbb{R} : t \neq 6\}$

Range

$\{y \in \mathbb{R} : (h = 0 \text{ and } y = 0) \text{ or } \left(h \neq 0 \text{ and } 2h + y \neq 0 \text{ and } h^2 + 144 \geq 24(h + y)\right)$
$\text{or } \left(h^2 \neq 12(h + y) \text{ and } 2h + y = 0 \text{ and } h^2 > 6(2h + y)\right)\}$

$\mathbb{R}$ is the set of real numbers

Series expansion at t=0

$$-\frac{1}{36}((h-12)h)t - \frac{1}{108}((h-6)h)t^2 - \frac{1}{432}((h-4)h)t^3 - \frac{((h-3)h)t^4}{1944} - \frac{(h(5h-12))t^5}{46656} + O\left(t^6\right)$$

(Taylor series)

Series expansion at t=∞

$$-2h - \frac{h(h+12)}{t} - \frac{12(h(h+6))}{t^2} - \frac{108(h(h+4))}{t^3} + O\left(\left(\frac{1}{t}\right)^4\right)$$

(Laurent series)

Derivative

$$\frac{\partial}{\partial t}\left(\frac{\left(2 - \frac{h}{6-t}\right)ht}{6-t}\right) = \frac{h(h(t+6) + 12(t-6))}{(t-6)^3}$$

Indefinite integral

$$\int \frac{h\left(2 - \frac{h}{6-t}\right)t}{6-t}\,dt = -h\left(2\left(-\frac{3h}{t-6} + t - 6\right) + (h+12)\log(t-6)\right) + \text{constant}$$

(assuming a complex-valued logarithm)

log(x) is the natural logarithm

Global maxima

$$\max\left\{\frac{\left(2-\frac{h}{6-t}\right)h\,t}{6-t}\right\} = \begin{cases} \frac{1}{24}(h-12)^2 & h<0 \vee 0<h<12 \vee h>12 \\ 0 & \text{(otherwise)} \end{cases} \quad \text{for } h=0$$

$$\max\left\{\frac{\left(2-\frac{h}{6-t}\right)h\,t}{6-t}\right\} = \begin{cases} \frac{1}{24}(h-12)^2 & h<0 \vee 0<h<12 \vee h>12 \\ 0 & \text{(otherwise)} \end{cases} \quad \text{for } t=\frac{72-6h}{h+12}$$

$e_1 \vee e_2 \vee \ldots$ is the logical OR function

Limit

$$\lim_{t\to\pm\infty} \frac{h\left(2-\frac{h}{6-t}\right)t}{6-t} = -2h$$

Series representations

$$\frac{h\left(2-\frac{h}{6-t}\right)t}{6-t} = -\frac{1}{25}(-10+h)\,h + \sum_{n=1}^{\infty}(-1+t)^n(-1)\left(5^{-2-n}\,h\,(-60+h+6\,h\,n)\right)$$

$$\frac{h\left(2-\frac{h}{6-t}\right)t}{6-t} = \sum_{n=-\infty}^{\infty}\left(\begin{cases} -6^{-1-n}\,h\,(-12+h\,n) & n>0 \\ 0 & \text{otherwise} \end{cases}\right)t^n$$

From the indefinite integral result

$$\int \frac{h\left(2-\frac{h}{6-t}\right)t}{6-t}\,dt = -h\left(2\left(-\frac{3\,h}{t-6}+t-6\right)+(h+12)\log(t-6)\right) + \text{constant}$$

(assuming a complex-valued logarithm)

we obtain:

-h (2 (-6 - (3 h)/(-6 + t) + t) + (12 + h) log(-6 + t))

Input

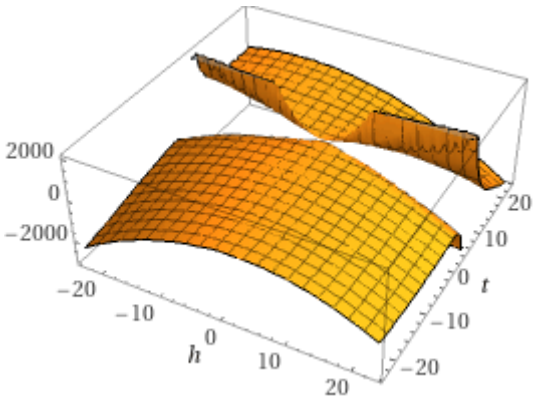
$$-h\left(2\left(-6-\frac{3h}{-6+t}+t\right)+(12+h)\log(-6+t)\right)$$

log(x) is the natural logarithm

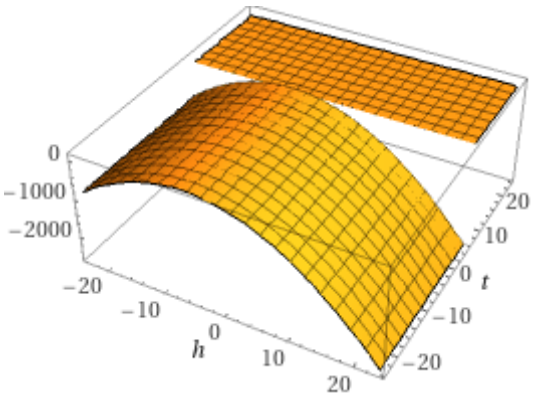
3D plots

Real part **(figures that can be related to the D-branes/Instantons)**

The key observation from the below plots and is that at $h = 1$, which is taken as the energy density of the universe at the Big Bang, with $t = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.

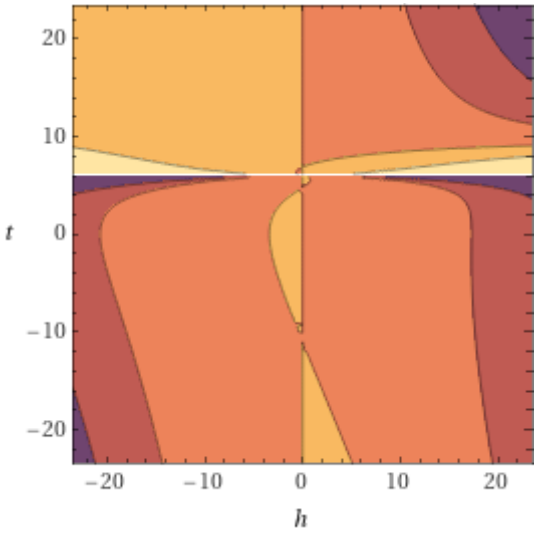


Imaginary part

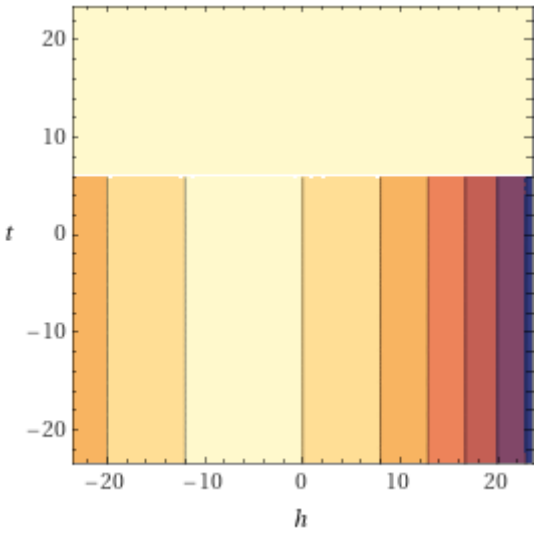


Contour plots

Real part



Imaginary part



Alternate forms

$$-\frac{h\left((h+12)\,(t-6)\log(t-6)-6\,h+2\,t^2-24\,t+72\right)}{t-6}$$

$$\frac{2h\left(3h - t^2 + 12t - 36\right)}{t-6} - h\,(h+12)\log(t-6)$$

$$h^2\left(\frac{6}{t-6} - \log(t-6)\right) + h\,(-2t - 12\log(t-6) + 12)$$

Alternate forms assuming h and t are positive

$$-2h\left(-\frac{3h}{t-6} + t - 6\right) - h\,(h+12)\log(t-6)$$

$$2h\left(\frac{3h}{t-6} - t + 6\right) - h\,(h+12)\log(t-6)$$

Expanded logarithmic form

$$-h\,(-12) + \frac{6h^2}{-6+t} - h\,2t - h\,12\log(-6+t) - h^2\log(-6+t)$$

Reduced logarithmic form

$$-\frac{h\left(2\left(36 - 3h - 12t + t^2\right) + (12+h)\,(-6+t)\log(-6+t)\right)}{-6+t}$$

Property as a real function

Domain

$\{t \in \mathbb{R} : t > 6\}$

$\mathbb{R}$ is the set of real numbers

Series expansion at t=0

$$\begin{cases} -h\left(\left((h-12)+\left(\frac{h}{6}+2\right)t+\frac{h\,t^2}{36}+\frac{h\,t^3}{216}+\frac{h\,t^4}{1296}+\frac{h\,t^5}{7776}+O\left(t^6\right)\right)+\right. & \text{Im}(t)<0 \\ \left.\quad (h+12)\left((i\,\pi+\log(6))-\frac{t}{6}-\frac{t^2}{72}-\frac{t^3}{648}-\frac{t^4}{5184}-\frac{t^5}{38880}+O\left(t^6\right)\right)^*\right) & \\ h\,(-h+h\,(-(\log(6)+i\,\pi))+12-12\,(\log(6)+i\,\pi))- & \text{(otherwise)} \\ \quad \frac{1}{72}\,((h-12)\,h)\,t^2-\frac{1}{324}\,((h-6)\,h)\,t^3-\frac{((h-4)\,h)\,t^4}{1728}-\frac{((h-3)\,h)\,t^5}{9720}+O\left(t^6\right) & \end{cases}$$

z^* is the complex conjugate of z

$\text{Im}(z)$ is the imaginary part of z

Series expansion at t=∞

$$-2\,h\,t-h\,((h+12)\log(t)-12)+\frac{12\,h\,(h+6)}{t}+\frac{54\,h\,(h+4)}{t^2}+O\left(\left(\frac{1}{t}\right)^3\right)$$

(Puiseux series)

Derivative

$$\frac{\partial}{\partial t}\left(-h\left(2\left(-6-\frac{3\,h}{-6+t}+t\right)+(12+h)\log(-6+t)\right)\right)=-\frac{h\,t\,(h+2\,(-6+t))}{(-6+t)^2}$$

Indefinite integral

$$\int -h\left(2\left(-6-\frac{3\,h}{-6+t}+t\right)+(12+h)\log(-6+t)\right)dt=$$
$$-h\left(-h\,t-6\,(h+12)\log(6-t)+(h\,(t-6)+12\,t)\log(t-6)+t^2-24\,t+36\right)+$$
constant

(assuming a complex-valued logarithm)

From the indefinite integral result

$$\int -h\left(2\left(-6-\frac{3h}{-6+t}+t\right)+(12+h)\log(-6+t)\right)dt =$$
$$-h\left(-ht-6(h+12)\log(6-t)+(h(t-6)+12t)\log(t-6)+t^2-24t+36\right)+$$
constant

(assuming a complex-valued logarithm)

we obtain:

-h (36 - 24 t - h t + t^2 - 6 (12 + h) log(6 - t) + (h (-6 + t) + 12 t) log(-6 + t))

Input

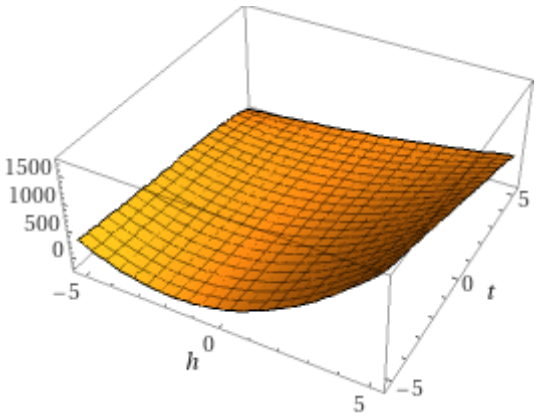
$$-h\left(36-24t-ht+t^2-6(12+h)\log(6-t)+(h(-6+t)+12t)\log(-6+t)\right)$$

log(x) is the natural logarithm

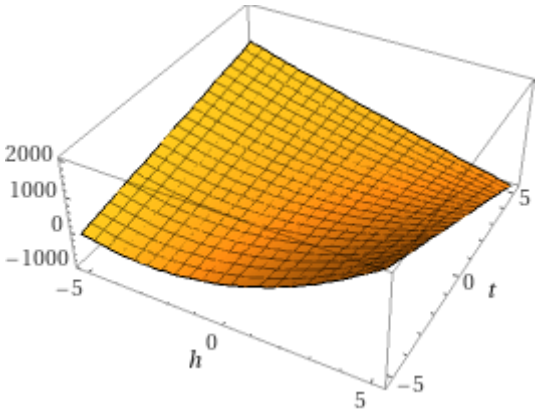
3D plots

Real part **(figures that can be related to the D-branes/Instantons)**

The key observation from the below plots and is that at $h = 1$, which is taken as the energy density of the universe at the Big Bang, with $t = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.

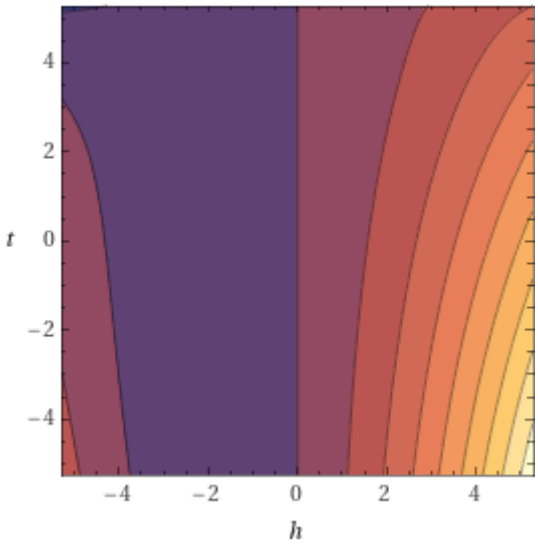


Imaginary part

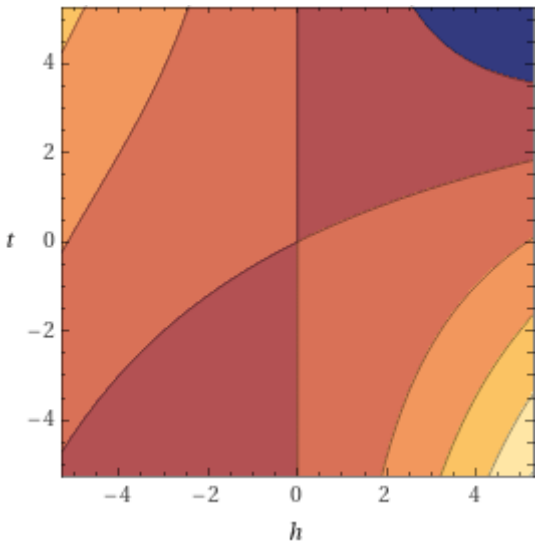


Contour plots

Real part



Imaginary part



Alternate forms

$$-h\left(-h\,t-6\,(h+12)\log(6-t)+(h\,t-6\,h+12\,t)\log(t-6)+t^2-24\,t+36\right)$$

$$-h\left(-(h+24)\,t-6\,(h+12)\log(6-t)+((h+12)\,t-6\,h)\log(t-6)+t^2+36\right)$$

$$h\left(h\,t+6\,h\log(6-t)-t^2+24\,t+72\log(6-t)-36\right)-h\,(h\,t-6\,h+12\,t)\log(t-6)$$

Alternate forms assuming h and t are positive

$$h\left(h\,t+6\,(h+12)\log(6-t)-(h\,(t-6)+12\,t)\log(t-6)-t^2+24\,t-36\right)$$

$$h^2\,t-h\,t^2+24\,h\,t+6\,(h+12)\,h\log(6-t)-h\,(h\,(t-6)+12\,t)\log(t-6)-36\,h$$

Expanded logarithmic form

$$-h\,36-h\,(-24)\,t+h^2\,t-h\,t^2-h\,(-72)\log(6-t)-h^2\,(-6)\log(6-t)-h^2\,(-6)\log(-6+t)-h\,12\,t\log(-6+t)-h^2\,t\log(-6+t)$$

Series expansion at t=0

$$\begin{cases} -h\left(\left((36-6(h+12)\log(6))-12t+\left(\frac{h}{12}+2\right)t^2+\right.\right. & \mathrm{Im}(t)<0 \\ \quad \frac{1}{108}(h+12)t^3+\frac{1}{864}(h+12)t^4+\frac{(h+12)t^5}{6480}+O\left(t^6\right)\Big)+ & \\ \quad \left(-6h+(h+12)t+O\left(t^6\right)\right) & \\ \quad \left.\left((i\pi+\log(6))-\frac{t}{6}-\frac{t^2}{72}-\frac{t^3}{648}-\frac{t^4}{5184}-\frac{t^5}{38\,880}+O\left(t^6\right)\right)^*\right) & \\ 6h(h(\log(36)+i\pi)-6+12\log(6))+ & \text{(otherwise)} \\ \quad ht(-h-(h+12)(\log(6)+i\pi)+12)- & \\ \quad \frac{1}{216}((h-12)h)t^3-\frac{((h-6)h)t^4}{1296}-\frac{((h-4)h)t^5}{8640}+O\left(t^6\right) & \end{cases}$$

z^* is the complex conjugate of z

$\mathrm{Im}(z)$ is the imaginary part of z

Series expansion at t=∞

$$-ht^2+ht(-(h+12)\log(t)+h+24)+ \\ 6h(h\log(t)+(h+12)\log(-t)+h+6)-\frac{54(h(h+4))}{t}+O\left(\left(\frac{1}{t}\right)^2\right)$$

(generalized Puiseux series)

Derivative

$$\frac{\partial}{\partial t}\left(-h\left(36-24t-ht+t^2-6(12+h)\log(6-t)+(h(-6+t)+12t)\log(-6+t)\right)\right)= \\ h\left(-\frac{6h}{6-t}-(12+h)\log(-6+t)-2t+12\right)$$

Indefinite integral

$$\int -h\left(36-24t-ht+t^2-6(12+h)\log(6-t)+(h(-6+t)+12t)\log(-6+t)\right) \\ dt= \\ 6h(h(t-9)+12(t-3))\log(6-t)-\frac{1}{12}ht\left(-9h(t-12)+6(h(t-12)+12t)\log(\right. \\ \left.t-6)+4\left(t^2-45t+216\right)\right)+\text{constant}$$

(assuming a complex-valued logarithm)

Alternative representations

$$-h\left(36-24\,t-h\,t+t^2-6\,(12+h)\log(6-t)+(h\,(-6+t)+12\,t)\log(-6+t)\right)=$$
$$-h\left(36-24\,t-h\,t-6\,(12+h)\log(a)\log_a(6-t)+\right.$$
$$\left.(h\,(-6+t)+12\,t)\log(a)\log_a(-6+t)+t^2\right)$$

$$-h\left(36-24\,t-h\,t+t^2-6\,(12+h)\log(6-t)+(h\,(-6+t)+12\,t)\log(-6+t)\right)=$$
$$-h\left(36-24\,t-h\,t-6\,(12+h)\log_e(6-t)+(h\,(-6+t)+12\,t)\log_e(-6+t)+t^2\right)$$

$$-h\left(36-24\,t-h\,t+t^2-6\,(12+h)\log(6-t)+(h\,(-6+t)+12\,t)\log(-6+t)\right)=$$
$$-h\left(36-24\,t-h\,t-(h\,(-6+t)+12\,t)\,\mathrm{Li}_1(7-t)+6\,(12+h)\,\mathrm{Li}_1(-5+t)+t^2\right)$$

$\log_b(x)$ is the base-b logarithm

$\mathrm{Li}_n(x)$ is the polylogarithm function

Series representations

$$-h\left(36-24\,t-h\,t+t^2-6\,(12+h)\log(6-t)+(h\,(-6+t)+12\,t)\log(-6+t)\right)=$$
$$-h\left(36-24\,t-h\,t+t^2+\right.$$
$$\left.\sum_{k=1}^{\infty}\frac{(-1)^k\left(6\,(12+h)\,(5-t)^k-(-7+t)^k\,(h\,(-6+t)+12\,t)\right)}{k}\right)$$

for $(|5-t|<1$ and $|-7+t|<1)$

$$-h\left(36-24\,t-h\,t+t^2-6\,(12+h)\log(6-t)+(h\,(-6+t)+12\,t)\log(-6+t)\right)=$$
$$-h\left(36-24\,t-h\,t+t^2-72\log(5-t)-6\,h\log(5-t)-6\,h\log(-7+t)+\right.$$
$$12\,t\log(-7+t)+h\,t\log(-7+t)+72\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-t)^{-k}}{k}+$$
$$6\,h\sum_{k=1}^{\infty}\frac{(-1)^k\,(5-t)^{-k}}{k}+6\,h\sum_{k=1}^{\infty}\frac{(-1)^k\,(-7+t)^{-k}}{k}-$$
$$\left.12\,t\sum_{k=1}^{\infty}\frac{(-1)^k\,(-7+t)^{-k}}{k}-h\,t\sum_{k=1}^{\infty}\frac{(-1)^k\,(-7+t)^{-k}}{k}\right)$$

for $(|5-t|>1$ and $|-7+t|>1)$

$$-h\left(36-24\,t-h\,t+t^2-6\,(12+h)\log(6-t)+(h\,(-6+t)+12\,t)\log(-6+t)\right)=$$
$$-h\left(36-24\,t-h\,t+t^2+\sum_{j=1}^{\infty}\left(-6\,(12+h)\left(\text{Res}_{s=-j}\,\frac{(5-t)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\right)+\right.\right.$$
$$\left.\left.(h\,(-6+t)+12\,t)\left(\text{Res}_{s=-j}\,\frac{(-7+t)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\right)\right)\right)$$

for $(|5-t|<1$ and $|-7+t|<1)$

$|z|$ is the absolute value of z

$\Gamma(x)$ is the gamma function

$\text{Res}_{z=z_0}\,f$ is a complex residue

Integral representations

$$-h\left(36-24\,t-h\,t+t^2-6\,(12+h)\log(6-t)+(h\,(-6+t)+12\,t)\log(-6+t)\right)=$$
$$-36\,h+24\,h\,t+h^2\,t-h\,t^2+$$
$$\int_1^{-6+t}-\left(\left(h\left(12\,(-6+t)\,(t\,(-2+\tau)-5\,\tau)+h\left(-72+t\,(24-17\,\tau)+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.t^2\,(-2+\tau)+60\,\tau\right)\right)\right)\Big/\left((12+t\,(-2+\tau)-5\,\tau)\,\tau\right)\right)d\tau$$

$$-h\left(36-24\,t-h\,t+t^2-6\,(12+h)\log(6-t)+(h\,(-6+t)+12\,t)\log(-6+t)\right)=$$
$$-h\left(36-24\,t-h\,t+t^2+\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(\frac{3\,i\,(12+h)\,(5-t)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\pi\,\Gamma(1-s)}-\right.\right.$$
$$\left.\left.\frac{i\,(-7+t)^{-s}\,(h\,(-6+t)+12\,t)\,\Gamma(-s)^2\,\Gamma(1+s)}{2\,\pi\,\Gamma(1-s)}\right)ds\right)$$

for $(|\arg(5-t)|<\pi$ and $|\arg(-7+t)|<\pi$ and $-1<\gamma<0)$

arg(z) is the complex argument

From the indefinite integral result

$$\int -h\left(36-24\,t-h\,t+t^2-6\,(12+h)\log(6-t)+(h\,(-6+t)+12\,t)\log(-6+t)\right)\,dt=$$
$$6\,h\,(h\,(t-9)+12\,(t-3))\log(6-t)-\frac{1}{12}\,h\,t\left(-9\,h\,(t-12)+6\,(h\,(t-12)+12\,t)\log(\right.$$
$$\left.t-6)+4\left(t^2-45\,t+216\right)\right)+\text{constant}$$

(assuming a complex-valued logarithm)

6 h (h (-9 + t) + 12 (-3 + t)) log(6 - t) - 1/12 h t (-9 h (-12 + t) + 4 (216 - 45 t + t^2) + 6 (h (-12 + t) + 12 t) log(-6 + t))

for h = 2, t = 4:

6*2 (2 (-9 + 4) + 12 (-3 + 4)) log(6 - 4) - 1/12*2*4*(-9*2*(-12 + 4) + 4 (216 – 45*4 + 4^2) + 6 (2 (-12 + 4) + 12*4) log(-6 + 4))

Input

$$(6\times 2)\,(2\,(-9+4)+12\,(-3+4))\log(6-4)-\frac{1}{12}\times 2\times 4$$
$$\left(-9\times 2\,(-12+4)+4\left(216-45\times 4+4^2\right)+6\,(2\,(-12+4)+12\times 4)\log(-6+4)\right)$$

log(x) is the natural logarithm

Result

$$24\log(2)-\frac{2}{3}\,(352+192\,(\log(2)+i\,\pi))$$

Decimal approximation

– 306.753973444900978846058807298317029746518680640133213095217387…

–

402.123859659493534523218353059776369177237683120013545084792907… i

Alternate complex forms

$$\left(24\log(2)-\frac{2}{3}(352+192\log(2))\right)-(128\pi)\,i$$

$$\frac{8}{3}\sqrt{2304\pi^2+(88+39\log(2))^2}\left(\cos\left(-\pi-\tan^{-1}\left(\frac{128\pi}{24\log(2)-\frac{2}{3}(352+192\log(2))}\right)\right)+i\sin\left(-\pi-\tan^{-1}\left(\frac{128\pi}{24\log(2)-\frac{2}{3}(352+192\log(2))}\right)\right)\right)$$

$$\frac{8}{3}\sqrt{2304\pi^2+(88+39\log(2))^2}\exp\left(i\left(-\pi-\tan^{-1}\left(\frac{128\pi}{24\log(2)-\frac{2}{3}(352+192\log(2))}\right)\right)\right)$$

i is the imaginary unit

$\tan^{-1}(x)$ is the inverse tangent function

Polar coordinates

$r \approx 505.77$ (radius), $\theta \approx -2.2225$ (angle)

505.77

Alternate forms

$$\frac{8}{3}(-88-48\,i\,\pi-39\log(2))$$

$$-\frac{8}{3}(88+48\,i\,\pi+39\log(2))$$

$$-104\log(2)-\frac{64}{3}\,i\,(6\pi+-11\,i)$$

Expanded form

$$-\frac{704}{3}-128\,i\,\pi-104\log(2)$$

Alternative representations

$$((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6\left(2(-12+4)+12\times 4\right)\log(-6+4)\right)=24\log(a)\log_a(2)-\frac{8}{12}\left(144+192\log(a)\log_a(-2)+4\left(36+4^2\right)\right)$$

$$((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6\left(2(-12+4)+12\times 4\right)\log(-6+4)\right)=24\log_e(2)-\frac{8}{12}\left(144+192\log_e(-2)+4\left(36+4^2\right)\right)$$

$$((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6\left(2(-12+4)+12\times 4\right)\log(-6+4)\right)=-24\,\mathrm{Li}_1(-1)-\frac{8}{12}\left(144-192\,\mathrm{Li}_1(3)+4\left(36+4^2\right)\right)$$

$\log_b(x)$ is the base-b logarithm

$\mathrm{Li}_n(x)$ is the polylogarithm function

Series representations

$$((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)=-\frac{704}{3}-128\,i\,\pi-208\,i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor-104\log(x)+104\sum_{k=1}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}}{k}\quad\text{for } x<0$$

$$((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)=-\frac{704}{3}-128\,i\,\pi-104\left\lfloor\frac{\arg(2-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)-104\log(z_0)-104\left\lfloor\frac{\arg(2-z_0)}{2\pi}\right\rfloor\log(z_0)+104\sum_{k=1}^{\infty}\frac{(-1)^k(2-z_0)^k z_0^{-k}}{k}$$

$$((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)=-\frac{704}{3}-128\,i\,\pi-208\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor-104\log(z_0)+104\sum_{k=1}^{\infty}\frac{(-1)^k(2-z_0)^k z_0^{-k}}{k}$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

Integral representations

$$((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)=-\frac{704}{3}-128\,i\,\pi-104\int_1^2\frac{1}{t}\,dt$$

$$((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)=-\frac{704}{3}-128\,i\,\pi+\frac{52\,i}{\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\quad\text{for}\quad -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

From which:

Pi*((6*2 (2 (-9 + 4) + 12 (-3 + 4)) log(6 - 4) - 1/12*2*4*(-9*2*(-12 + 4) + 4 (216 – 45*4 + 4^2) + 6 (2 (-12 + 4) + 12*4) log(-6 + 4))))-144i-29i+1/√2*i

Input

$$\pi\left((6\times 2)(2(-9+4)+12(-3+4))\log(6-4)-\frac{1}{12}\times 2\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)\right)-144\,i-29\,i+\frac{1}{\sqrt{2}}\,i$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

Result

$$-173\,i+\frac{i}{\sqrt{2}}+\pi\left(24\log(2)-\frac{2}{3}(352+192(\log(2)+i\,\pi))\right)$$

Decimal approximation

$-963.696029433979434864638626026301860681481790558430607265336370\ldots$

$-$

$1435.602256558251355686414003622042496280868688189132726144320 38\ldots\, i$

Alternate complex forms

$$\pi\left(24\log(2)-\frac{2}{3}(352+192\log(2))\right)+\left(-173+\frac{1}{\sqrt{2}}-128\pi^2\right)i$$

$$\sqrt{\left(-173+\frac{1}{\sqrt{2}}-128\pi^2\right)^2+\frac{64}{9}\pi^2(88+39\log(2))^2}$$
$$\left(\cos\left(\tan^{-1}\left(\frac{-173+\frac{1}{\sqrt{2}}-128\pi^2}{\pi\left(24\log(2)-\frac{2}{3}(352+192\log(2))\right)}\right)-\pi\right)+\right.$$
$$\left.i\sin\left(\tan^{-1}\left(\frac{-173+\frac{1}{\sqrt{2}}-128\pi^2}{\pi\left(24\log(2)-\frac{2}{3}(352+192\log(2))\right)}\right)-\pi\right)\right)$$

$$\sqrt{\left(-173+\frac{1}{\sqrt{2}}-128\pi^2\right)^2+\frac{64}{9}\pi^2(88+39\log(2))^2}$$
$$\exp\left(i\left(\tan^{-1}\left(\frac{-173+\frac{1}{\sqrt{2}}-128\pi^2}{\pi\left(24\log(2)-\frac{2}{3}(352+192\log(2))\right)}\right)-\pi\right)\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Polar coordinates

$r \approx 1729.1$ (radius), $\theta \approx -2.1620$ (angle)

1729.1

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number).

Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternate forms

$$\frac{1}{6}\left(-1408\,\pi-768\,i\,\pi^2-1038\,i+3\,i\,\sqrt{2}\,-624\,\pi\log(2)\right)$$

$$-\frac{8}{3}\,\pi\,(88+39\log(2))+i\left(-173+\frac{1}{\sqrt{2}}-128\,\pi^2\right)$$

$$-173\,i+\frac{i}{\sqrt{2}}-128\,i\,\pi^2+\pi\left(-\frac{704}{3}-104\log(2)\right)$$

Expanded form

$$-173\,i+\frac{i}{\sqrt{2}}-\frac{704\,\pi}{3}-128\,i\,\pi^2-104\,\pi\log(2)$$

Alternative representations

$$\pi\left(((2\,(-9+4)+12\,(-3+4))\log(6-4))\,6\times 2-\right.$$
$$\frac{2}{12}\times 4\left(-9\times 2\,(-12+4)+4\left(216-45\times 4+4^2\right)+\right.$$
$$\left.\left.6\,(2\,(-12+4)+12\times 4)\log(-6+4)\right)\right)-i\,144-i\,29+\frac{i}{\sqrt{2}}=$$
$$-173\,i+\pi\left(24\log(a)\log_a(2)-\frac{8}{12}\left(144+192\log(a)\log_a(-2)+4\left(36+4^2\right)\right)\right)+$$
$$\frac{i}{\sqrt{2}}$$

$$\pi\left(((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)\right)-i\,144-i\,29+\frac{i}{\sqrt{2}}=-173\,i+\pi\left(24\log_e(2)-\frac{8}{12}\left(144+192\log_e(-2)+4\left(36+4^2\right)\right)\right)+\frac{i}{\sqrt{2}}$$

$$\pi\left(((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)\right)-i\,144-i\,29+\frac{i}{\sqrt{2}}=-173\,i+\pi\left(-24\,\mathrm{Li}_1(-1)-\frac{8}{12}\left(144-192\,\mathrm{Li}_1(3)+4\left(36+4^2\right)\right)\right)+\frac{i}{\sqrt{2}}$$

$\log_b(x)$ is the base- b logarithm

$\mathrm{Li}_n(x)$ is the polylogarithm function

Series representations

$$\pi\left(((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)\right)-i\,144-i\,29+\frac{i}{\sqrt{2}}=-173\,i+\frac{i}{\sqrt{2}}-\frac{704\,\pi}{3}-128\,i\,\pi^2-208\,i\,\pi^2\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor-104\,\pi\log(x)+104\,\pi\sum_{k=1}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}}{k}\quad\text{for } x<0$$

$$\pi\left(((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+\right.\right.$$
$$\left.\left.4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)\right)-$$
$$i\,144-i\,29+\frac{i}{\sqrt{2}}=-173\,i+\frac{i}{\sqrt{2}}-\frac{704\,\pi}{3}-128\,i\,\pi^2-$$
$$208\,i\,\pi^2\left\lfloor-\frac{-\pi+\arg\left(\frac{1}{z_0}\right)+\arg(z_0)}{2\,\pi}\right\rfloor-$$
$$104\,\pi\log(z_0)+104\,\pi\sum_{k=1}^{\infty}\frac{(-1)^k\,(2-z_0)^k\,z_0^{-k}}{k}$$

$$\pi\left(((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+\right.\right.$$
$$\left.\left.4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)\right)-$$
$$i\,144-i\,29+\frac{i}{\sqrt{2}}=-173\,i+\frac{i}{\sqrt{2}}-\frac{704\,\pi}{3}-128\,i\,\pi^2-$$
$$208\,i\,\pi^2\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\,\pi}\right\rfloor-$$
$$104\,\pi\log(z_0)+104\,\pi\sum_{k=1}^{\infty}\frac{(-1)^k\,(2-z_0)^k\,z_0^{-k}}{k}$$

$$\pi\left(((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+\right.\right.$$
$$\left.\left.4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)\right)-$$
$$i\,144-i\,29+\frac{i}{\sqrt{2}}=-173\,i+\frac{i}{\sqrt{2}}-\frac{704\,\pi}{3}-128\,i\,\pi^2-$$
$$104\,\pi\left\lfloor\frac{\arg(2-z_0)}{2\,\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)-$$
$$104\,\pi\log(z_0)-104\,\pi\left\lfloor\frac{\arg(2-z_0)}{2\,\pi}\right\rfloor\log(z_0)+$$
$$104\,\pi\sum_{k=1}^{\infty}\frac{(-1)^k\,(2-z_0)^k\,z_0^{-k}}{k}$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

Integral representations

$$\pi\left(((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)\right)-i\,144-i\,29+\frac{i}{\sqrt{2}}=-173\,i+\frac{i}{\sqrt{2}}-\frac{704\,\pi}{3}-128\,i\,\pi^2-104\,\pi\int_1^2\frac{1}{t}\,dt$$

$$\pi\left(((2(-9+4)+12(-3+4))\log(6-4))\,6\times 2-\frac{2}{12}\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)\right)-i\,144-i\,29+\frac{i}{\sqrt{2}}=-173\,i+\frac{i}{\sqrt{2}}-\frac{704\,\pi}{3}-128\,i\,\pi^2+52\,i\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\quad\text{for}\quad -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

(Pi*((6*2 (2 (-9 + 4) + 12 (-3 + 4)) log(6 - 4) - 1/12*2*4*(-9*2*(-12 + 4) + 4 (216 – 45*4 + 4^2) + 6 (2 (-12 + 4) + 12*4) log(-6 + 4))))-144i-29i+1/√2*i)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\left(\pi\left((6\times 2)(2(-9+4)+12(-3+4))\log(6-4)-\frac{1}{12}\times 2\times 4\left(-9\times 2(-12+4)+4\left(216-45\times 4+4^2\right)+6(2(-12+4)+12\times 4)\log(-6+4)\right)\right)-144\,i-29\,i+\frac{1}{\sqrt{2}}\,i\right)\wedge(1/15)+{C_{\text{MRB}}}^{1-1/(4\pi)+\pi}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

C_{MRB} is the MRB constant

Exact result

$$C_{\text{MRB}}{}^{1-1/(4\pi)+\pi} + \sqrt[15]{-173\,i + \frac{i}{\sqrt{2}} + \pi\left(24\log(2) - \frac{2}{3}(352 + 192(\log(2) + i\,\pi))\right)}$$

Decimal approximation

1.627897137094591702720640336213096156592293133692345826128658 44…

$-$

0.236108401643168052328807310195647084619504768874288388978573600…

i

Alternate complex forms

$1.6279 - 0.2361\,i$

$1.6449\,(\cos(-0.14403) + i\sin(-0.14403))$

$1.6449\,e^{-0.14403\,i}$

Polar coordinates

$r = 1.64493$ (radius), $\theta = -0.144029$ (angle)

1.64493 ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$C_{\text{MRB}}{}^{1-1/(4\pi)+\pi} + \sqrt[15]{\frac{1}{2}\,i\left(\sqrt{2} - 346\right) + \frac{8}{3}\,\pi\,(-88 - 48\,i\,\pi - 39\log(2))}$$

$$C_{\text{MRB}}{}^{1-1/(4\pi)+\pi} + \sqrt[15]{\frac{1}{6}\left(-1038\,i + 3\,i\,\sqrt{2} - 1408\,\pi - 768\,i\,\pi^2 - 624\,\pi\log(2)\right)}$$

$$C_{\text{MRB}}{}^{1-1/(4\pi)+\pi} + \sqrt[15]{\frac{1}{2}\,i\left(\sqrt{2} - 346\right) - 128\,i\,\pi^2 - \frac{8}{3}\,\pi\,(88 + 39\log(2))}$$

(1/27(((Pi*((6*2 (2 (-9 + 4) + 12 (-3 + 4)) log(6 - 4) - 1/12*2*4*(-9*2*(-12 + 4) + 4 (216 – 45*4 + 4^2) + 6 (2 (-12 + 4) + 12*4) log(-6 + 4))))-144i-29i+1/√2*i)+i)))^2-i+1/5

Input

$$\left(\frac{1}{27}\left(\left(\pi\left((6\times 2)\,(2\,(-9+4)+12\,(-3+4))\log(6-4) - \frac{1}{12}\times 2\times 4\left(-9\times 2\,(-12+4)+4\left(216-45\times 4+4^2\right)+6\,(2\,(-12+4)+12\times 4)\log(-6+4)\right)\right) - 144\,i - 29\,i + \frac{1}{\sqrt{2}}\,i\right) + i\right)\right)^2 - i + \frac{1}{5}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

Result

$$\left(\frac{1}{5} - i\right) + \frac{1}{729}\left(-172\,i + \frac{i}{\sqrt{2}} + \pi\left(24\log(2) - \frac{2}{3}\,(352 + 192\,(\log(2) + i\,\pi))\right)\right)^2$$

Decimal approximation

$$-1549.009324245829201091151645664623276366750865567893884355876 43\ldots + 3791.923178222809095241560987423416326873418903807141844302401 89\ldots\,i$$

Alternate complex forms

$$\left(\frac{1}{5}+\frac{1}{729}\left(-\left(-172+\frac{1}{\sqrt{2}}-128\,\pi^2\right)^2+\pi^2\left(24\log(2)-\frac{2}{3}\left(352+192\log(2)\right)\right)^2\right)\right)+\left(-1+\frac{2}{729}\,\pi\left(-172+\frac{1}{\sqrt{2}}-128\,\pi^2\right)\left(24\log(2)-\frac{2}{3}\left(352+192\log(2)\right)\right)\right)i$$

$$\sqrt{\left(\left(1-\frac{8\,\pi\left(344-\sqrt{2}+256\,\pi^2\right)\left(88+39\log(2)\right)}{2187}\right)^2+\left(\frac{1}{729}\left(\left(-172+\frac{1}{\sqrt{2}}-128\,\pi^2\right)^2-\frac{64}{9}\,\pi^2\left(88+39\log(2)\right)^2\right)-\frac{1}{5}\right)^2\right)}\left(\cos\left(\pi+\tan^{-1}\left(\left(\frac{2}{729}\,\pi\left(-172+\frac{1}{\sqrt{2}}-128\,\pi^2\right)\left(24\log(2)-\frac{2}{3}\left(352+192\log(2)\right)\right)-1\right)\Big/\left(\frac{1}{5}+\frac{1}{729}\left(\pi^2\left(24\log(2)-\frac{2}{3}\left(352+192\log(2)\right)\right)^2-\left(-172+\frac{1}{\sqrt{2}}-128\,\pi^2\right)^2\right)\right)\right)\right)+i\sin\left(\pi+\tan^{-1}\left(\left(\frac{2}{729}\,\pi\left(-172+\frac{1}{\sqrt{2}}-128\,\pi^2\right)\left(24\log(2)-\frac{2}{3}\left(352+192\log(2)\right)\right)-1\right)\Big/\left(\frac{1}{5}+\frac{1}{729}\left(\pi^2\left(24\log(2)-\frac{2}{3}\left(352+192\log(2)\right)\right)^2-\left(-172+\frac{1}{\sqrt{2}}-128\,\pi^2\right)^2\right)\right)\right)\right)$$

$$\sqrt{\left(\left(1-\frac{8\,\pi\left(344-\sqrt{2}+256\,\pi^2\right)\left(88+39\log(2)\right)}{2187}\right)^2+\left(\frac{1}{729}\left(\left(-172+\frac{1}{\sqrt{2}}-128\,\pi^2\right)^2-\frac{64}{9}\,\pi^2\left(88+39\log(2)\right)^2\right)-\frac{1}{5}\right)^2\right)}\exp\left(i\left(\pi+\tan^{-1}\left(\left(\frac{2}{729}\,\pi\left(-172+\frac{1}{\sqrt{2}}-128\,\pi^2\right)\left(24\log(2)-\frac{2}{3}\left(352+192\log(2)\right)\right)-1\right)\Big/\left(\frac{1}{5}+\frac{1}{729}\left(\pi^2\left(24\log(2)-\frac{2}{3}\left(352+192\log(2)\right)\right)^2-\left(-172+\frac{1}{\sqrt{2}}-128\,\pi^2\right)^2\right)\right)\right)\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Polar coordinates

$r \approx 4096.1$ (radius), $\theta \approx 1.9586$ (angle)

$4096.1 \approx 4096$

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternate forms

$$-\frac{1}{65\,610}\left(2\,649\,483+65\,610\,i-15\,480\sqrt{2}-7\,265\,280\,i\,\pi+21\,120\,i\sqrt{2}\,\pi-993\,280\,\pi^2-11\,520\sqrt{2}\,\pi^2-5\,406\,720\,i\,\pi^3+1\,474\,560\,\pi^4-973\,440\,\pi^2\log^2(2)-3\,219\,840\,i\,\pi\log(2)+9360\,i\sqrt{2}\,\pi\log(2)-4\,392\,960\,\pi^2\log(2)-2\,396\,160\,i\,\pi^3\log(2)\right)$$

$$\left(\frac{1}{5}-i\right)-\frac{\left(3\left(\sqrt{2}\ -344\right)+16\,\pi\,(88\,i-48\,\pi+39\,i\log(2))\right)^2}{26244}$$

$$\left(\frac{1}{5}-i\right)-\frac{\left(3\left(\sqrt{2}\ -344\right)-768\,\pi^2+16\,i\,\pi\,(88+39\log(2))\right)^2}{26244}$$

Expanded form

$$\left(-\frac{98129}{2430}-i\right)+\frac{172\,\sqrt{2}}{729}+\frac{242176\,i\,\pi}{2187}-\frac{704\,i\,\sqrt{2}\ \pi}{2187}+\frac{99328\,\pi^2}{6561}+$$
$$\frac{128\,\sqrt{2}\ \pi^2}{729}+\frac{180224\,i\,\pi^3}{2187}-\frac{16384\,\pi^4}{729}+\frac{10816}{729}\,\pi^2\log^2(2)+$$
$$\frac{35776}{729}\,i\,\pi\log(2)-\frac{104}{729}\,i\,\sqrt{2}\ \pi\log(2)+\frac{146432\,\pi^2\log(2)}{2187}+\frac{26624}{729}\,i\,\pi^3\log(2)$$

Alternative representations

$$\left(\frac{1}{27}\left(\left(\pi\left((6\times2)\,(2\,(-9+4)+12\,(-3+4))\log(6-4)-\right.\right.\right.\right.$$
$$\left.\left.\frac{2}{12}\left(4\left(-9\times2\,(-12+4)+4\left(216-45\times4+4^2\right)+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.6\,(2\,(-12+4)+12\times4)\log(-6+4)\right)\right)\right)-$$
$$\left.\left.\left.\left.i\,144-i\,29+\frac{i}{\sqrt{2}}\right)+i\right)\right)^2-i+\frac{1}{5}=-i+\frac{1}{5}+$$
$$\left(\frac{1}{27}\left(-172\,i+\pi\left(24\log_e(2)-\frac{8}{12}\left(144+192\log_e(-2)+4\left(36+4^2\right)\right)\right)+\frac{i}{\sqrt{2}}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\pi\left((6\times 2)\,(2\,(-9+4)+12\,(-3+4))\log(6-4)-\right.\right.\right.\right.$$
$$\frac{2}{12}\left(4\left(-9\times 2\,(-12+4)+4\left(216-45\times 4+4^2\right)+\right.\right.$$
$$\left.\left.\left.\left.6\,(2\,(-12+4)+12\times 4)\log(-6+4)\right)\right)\right)-$$
$$i\,144-i\,29+\frac{i}{\sqrt{2}}\Bigg)+i\Bigg)\Bigg)^2-i+\frac{1}{5}=-i+\frac{1}{5}+$$
$$\left(\frac{1}{27}\left(-172\,i+\pi\left(24\log(a)\log_a(2)-\frac{8}{12}\left(144+192\log(a)\log_a(-2)+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.4\left(36+4^2\right)\right)\right)+\frac{i}{\sqrt{2}}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\pi\left((6\times 2)\,(2\,(-9+4)+12\,(-3+4))\log(6-4)-\right.\right.\right.\right.$$
$$\frac{2}{12}\left(4\left(-9\times 2\,(-12+4)+4\left(216-45\times 4+4^2\right)+\right.\right.$$
$$\left.\left.\left.\left.6\,(2\,(-12+4)+12\times 4)\log(-6+4)\right)\right)\right)-$$
$$i\,144-i\,29+\frac{i}{\sqrt{2}}\Bigg)+i\Bigg)\Bigg)^2-i+\frac{1}{5}=-i+\frac{1}{5}+$$
$$\left(\frac{1}{27}\left(-172\,i+\pi\left(-24\,\mathrm{Li}_1(-1)-\frac{8}{12}\left(144-192\,\mathrm{Li}_1(3)+4\left(36+4^2\right)\right)\right)+\frac{i}{\sqrt{2}}\right)\right)^2$$

$\log_b(x)$ is the base-b logarithm

$\mathrm{Li}_n(x)$ is the polylogarithm function

Observations and conclusions

Electromagnetic phenomena accompany periods of earthquakes, and which at that time often take the place of telluric motions. In addition to this, they predominate every year during one or two months which chooses between March and May or, at the latest, enters June and July. **The activity of the sun is the center of electromagnetic phenomena** (Michele Stefano De Rossi – "Meteorologia Endogena")

Recall that tidal force (generally used in the plural, tidal forces or tidal forces, and also with the expression tidal effects) is a secondary effect of the **force of gravity**. Tidal effects from different bodies can add up, as in the case of the alignment between the Moon and the Sun which gives rise to intense syzygial tides.

The undoubted correlation that Prof. De Rossi felt between the Corleone earthquakes and those of Monte Baldo last year moved me to pay special attention to the latter as well. Rummaging through the scientific yearbooks, I found the precise dates of the strongest earthquakes felt in 1866 on the slopes of Monte Baldo, namely: 13 June, 11 August and 7-8 November, which correspond to the new moons; in 1870 seismic activity reawakened there, but I don't know the dates; in 1876 the first strong shock occurred on April 23, that is, on the eve of the new moon; with the perigee (which took place on the 26th) the shocks prepared by the new moon continued until the 29th; then the frequency decreased until May 4th and it already seemed to have left those populations in peace; except that the next coincidence of the new moon with the perigee and with a strong northern declination (in which position, as I already said, one of the two passages to the meridian is an energetic occasion for an earthquake) provided me with such a clue of awakening, probably on a greater extent of land , that here I prepared myself for careful surveillance, so as not to miss the most important phases of the phenomenon, when this happened. I mentioned this probability to Prof. Don Timoteo Bertelli of Florence in my letter of May 1st and to Prof. Goiran of Verona in a letter of the same 12th. The critical day otherwise passed peacefully in Trieste; not so in Monte Baldo, where the tremors resumed on the 22nd and continued on the 23rd, to be repeated on the 29th; at the same time in Corleone the activity, which had seemed almost extinguished since the 10th, was reawakened with a shock on the 20th, one on the 21st, four on the 24th and with great energy on the 25th. On May 22nd, the eve of the new moon, the very strong earthquake also occurred of Spoleto and at the time of the new moon in question there was, it can be said, no region of the Apennines in which seismic activity did not manifest itself with greater or lesser force, as can be seen from the bulletin.

In Monte Baldo there was a truce during June; in July the tremors resumed the day after the full moon and continued thereafter without interruption; in the following months tremors were noted on August 7th, September 5th, October 9th and November 4th, that is, almost always one or two days after the full moon. It is remarkable that on May 22nd and 23rd, while the rest of Italy was shaking, there was a truce in Corleone and then an immediate awakening, and the truce that occurred in the new moons following Monte Baldo in the face of energy is equally significant. manifested itself at the same time as Corleone, where the endogenous forces were transported by geological-mechanical effects, which it is not my task to erudite. In 1870, as far as I can remember, the seismic period of Monte Baldo put an end to that of Monte Nevoso (Julian Alps). This began on February 28th with a strong tremor at 12.20 pm; the next day the shocks were repeated and so also on the day of the new moon, March 2, and the following; after a fifteen-day truce a shock was felt at the full moon; then there were other tremors, the dates of which I could not know; those that came to my attention, and were the strongest, occurred on April 28th (the eve of the new moon), on May 10th, on May 15th (full moon), on June 2nd (near the new moon) and several between the 13th and the 19th. June (full moon period). Then the activity died down there and arose in Monte Baldo. Monte Nevoso was frequently subject to earthquakes; in relatively recent times there was a long period from November 1750 to May 1753; and in 1838 the populations remained in suspense for three months. That local area includes the city of Rijeka; and even in the small earthquakes, which occur here from time to time, I have observed a decided prevalence of syzygies. From this we see that some seismic periods, although limited within very narrow boundaries, can be the effect of a large telluric cause. I took the Corleone period into special consideration, because this is one of the few whose phases have been carefully studied and from which there is a sufficiently large number of shocks to draw positive consequences. There was another seismic period of recent memory and well studied, that of Belluno; the existing relationship between it and the lunar positions has no need of my demonstrations, because the illustrious Falb proved it since he predicted, based on his theories, the return of the phenomenon even during the course of the period itself.

Perhaps all the seismic phenomena that occur in Italy have as their cause, if not direct, at least determining, the action of the stars, but while on the one hand the lack of sufficient observations does not allow very extensive studies, on the other hand the translocation, which often happens, seismic centers distract the attention of investigators so as not to allow them to glimpse the effects of a great common cause in isolated phenomena.

It is desirable that the invitation made repeatedly by Prof. Cav. De Rossi, in order to obtain the greatest possible number of reports on seismic phenomena, must be listened to by those who have the progress of science at heart and that no one abstains from communicating even crude observations of such phenomena, the memory of which without this could be lost to the detriment of science. (**DELL' ATTRAZIONE LUNI- SOLARE IN RELAZIONE COI FENOMENI MAREO – SISMICI** - STUDI DIMOSTRATIVI DI GIULIO GRABLOVITZ – 1877)

In conclusion:

While **the activity of the sun is the center of electromagnetic phenomena,** the tidal force, hence the luni-solar attraction, is a secondary effect of the **force of gravity**. The **aurora borealis**, for example, is a phenomenon visually characterized by luminous bands that take on a wide range of shapes and colours, rapidly changing in time and space, usually red-green-blue in colour, called auroral arcs, caused from the interaction of charged particles (protons and electrons) of solar origin (solar wind) with the terrestrial ionosphere (atmosphere between 100-500 km): these particles excite the atoms of the atmosphere which, subsequently de-energizing, emit light of various lengths 'wave. Solar activity is a source of emission of **electromagnetic waves** and **electrically charged particles**, the luni-solar attraction, is a secondary effect of the **force of gravity**. It is therefore possible to hypothesize a connection, albeit indirect, between these phenomena and "**gravitational waves**" which, among other things, travel at a speed equal to c (speed of light), as well as **electromagnetic waves**. Thus, there is a purely mathematical connection between seismic waves and gravitational waves.

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

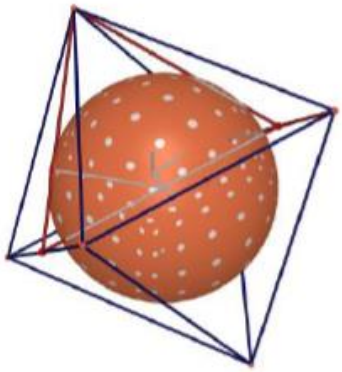


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\ l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.141939571526584308924330732196162632677513386811659044682541739 3

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$
$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

$4096 = 64^2$, (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$).

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.61805\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^8\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^8\right)^k}{k!}\right)\quad\text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$
$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

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$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi e^{0} \approx 3.1416$ (real, principal root)

$\pi e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1\sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003$ (real, principal root)

$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003$ (real root)

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\,\pi\left\lfloor\frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{8}{\pi^2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$n!$ is the factorial function

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$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times3}}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=$$

$$\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\;\sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=$$

$$\sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

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$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\mathrm{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13

…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\Big/\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}(C\times \mathrm{R}\times 2.33\cdot 10^{-13})}}\cong 1.61803398\ldots=\frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.6180359123482642354401744088347098542545273508401733563064818107 …

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\, x^2\, y\, z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$ is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.6018401361\times 10^{-24}\right)}}$$

1.618032997307532491506757016629746746422577260892967140791939590 3
…

1.6180329973075…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.4525642121\times 10^{-24}\right)}}$$

Result

1.644932352102092130483898983704151168876621841655166877914166033 8
…

1.64493235210209213…. ≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

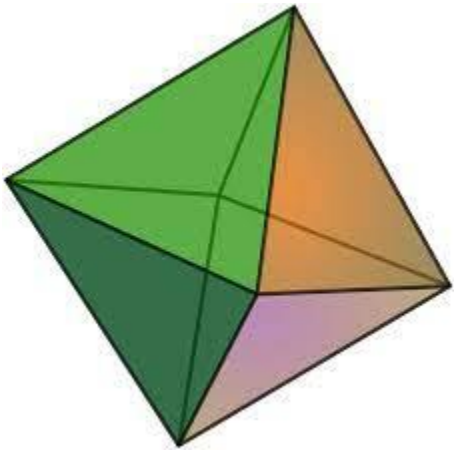
Result

3.14159225731469939939950039231605796469731171781644423955790024797

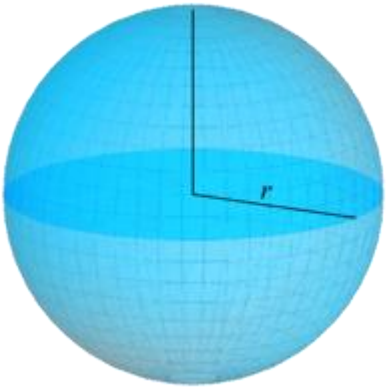
…

3.14159225731469…. ≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find *a*, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

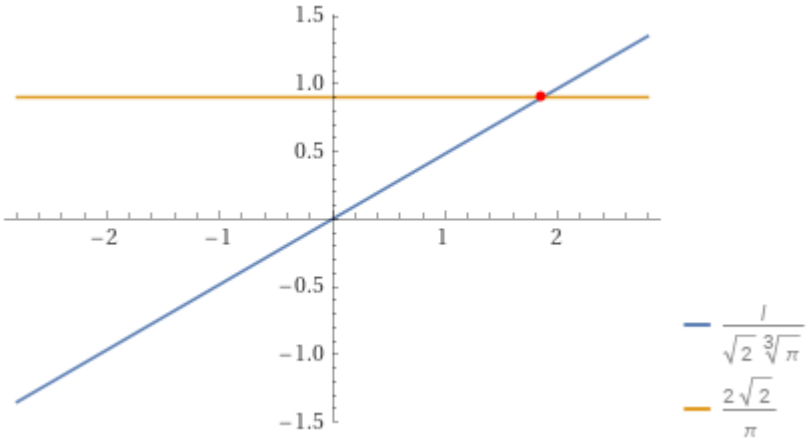
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,3}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not}\ (z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

1.64381856858…. $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\text{^}\,(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.$$
$$\left.\left.\left.108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-\right.\right.$$
$$\left.\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/\right.$$
$$\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\wedge(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.$$
$$\left.\left.\left.108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.$$
$$\left.\left.\left.2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-\right.\right.\right.$$
$$\left.\left.\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/\right.$$
$$\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\wedge(1/15)\Bigg)$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

–5.010882647757...

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\,\sqrt{6}}\right)^2\right\} = 0$$

$$\text{for } b = -\frac{226\,802\,245}{18\,480\,874}$$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

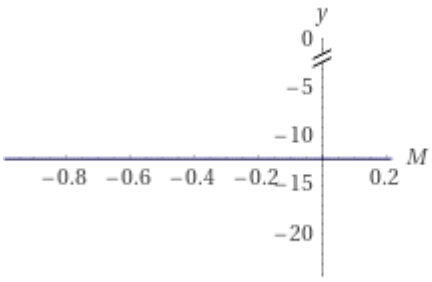
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

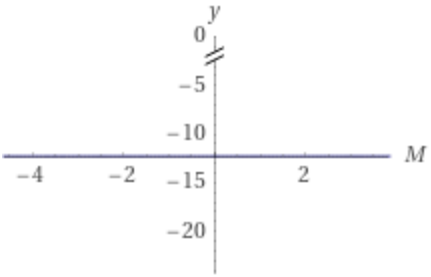
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

$$-12.2723$$

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V = \frac{1}{3}(0.0814845\,b + 1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

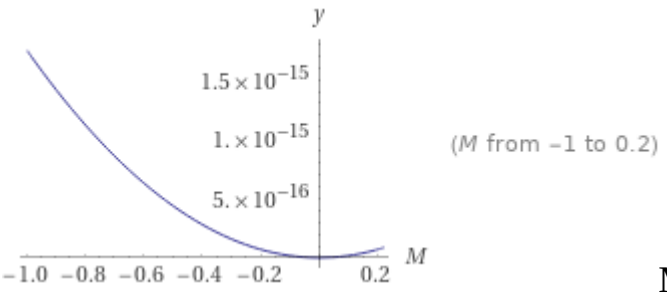
Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\,M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

Result:

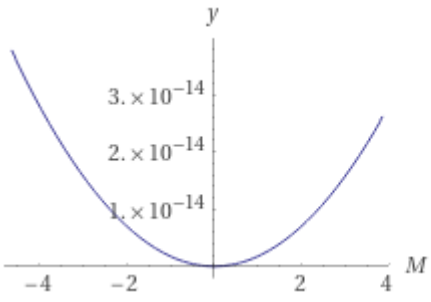
0

Plots: **(possible mathematical connection with an open string)**



M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O(M^{62194})$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^\infty \left(\frac{1}{3} M^2 \left(1 + \frac{18.4084 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4} \right)}{M^2} \right)^2 - 1.75541 \times 10^{-15}\, M^2 \right) dM = 0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3} \left(0.0814845 \times \frac{225.913 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4} \right)}{M^2} + 1 \right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3} \left(0.0814845 \times \frac{225.913 \left(-0.054323\, (-0.5)^2 + 6.58545 \times 10^{-10} \sqrt{(-0.5)^4} \right)}{(-0.5)^2} + 1 \right)^2 \left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots \times 10^{-16}$$

-4.38851344947*10^{-16}

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times 10^{-17}$

7.021621519159*10^{-17}

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

$1.57986484181*10^{-14}$

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 2^2 + 6.58545 \times 10^{-10}\sqrt{2^4}\right)}{2^2} + 1\right)^2 \times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_{0}}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\,\hat{}\,(1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

$5.729475 * 10^{-35}$ Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

$1.820306 * 10^{61}$ V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

$5.975498*10^{-8}$ V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

$1.042940*10^{27}$ V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

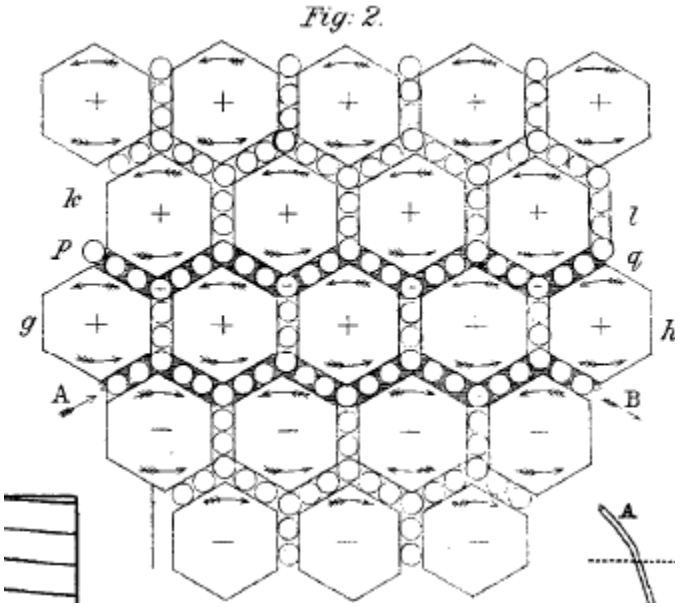
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

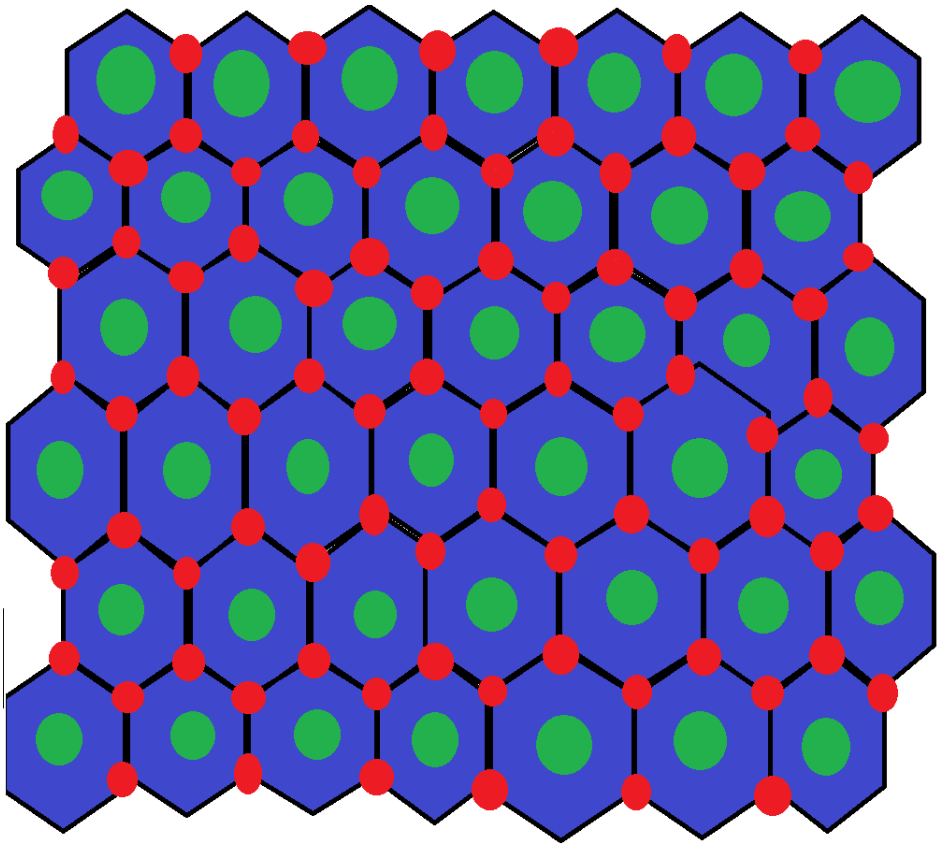
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

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Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On some equations concerning the seismology and the calculation relating to the tides and solar eclipses. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory IV

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper (part IV), we analyze some equations concerning the seismology and the calculation relating to the tides and solar eclipses. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory

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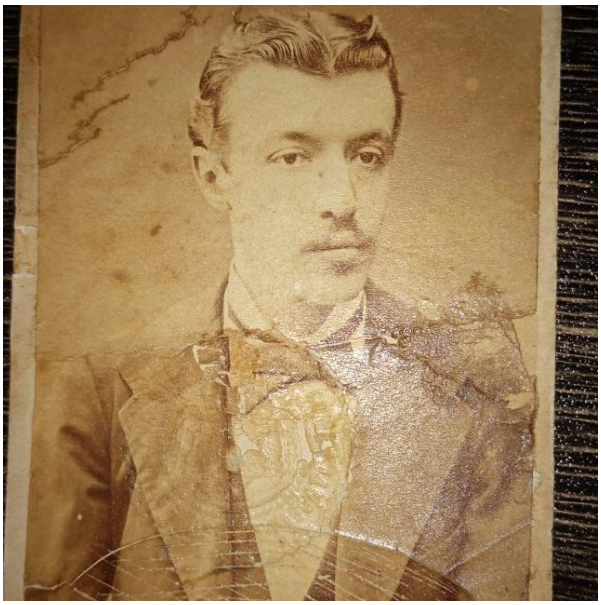
Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

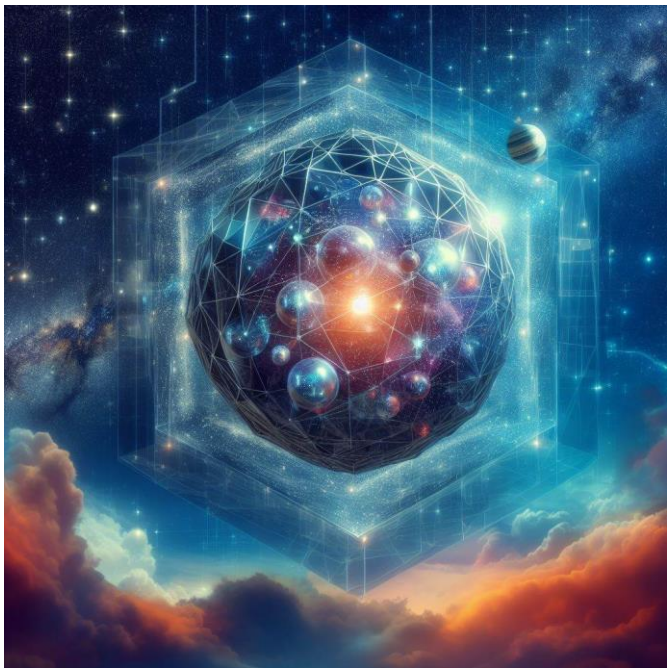
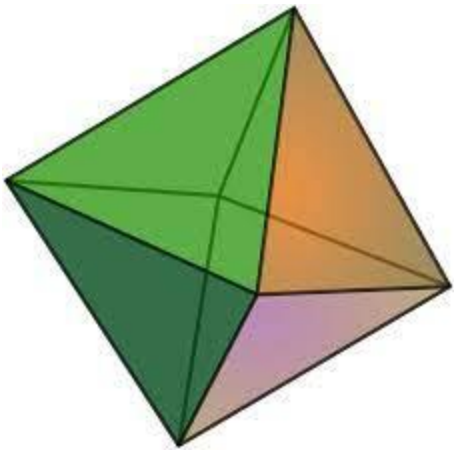
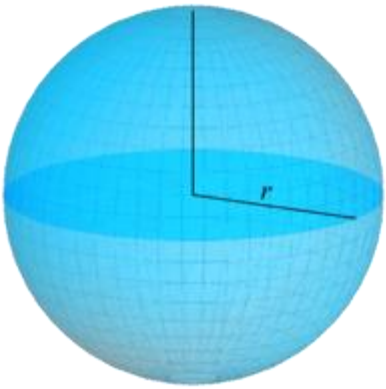


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume $V = 1/3*\sqrt{2}\ l^3$ and, from the sphere volume, $V = (4/3*\pi*r^3)$, we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\pi x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$l = 0, \quad x = 0$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt{2}\ \sqrt[3]{\pi}\right) = \log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\ \pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

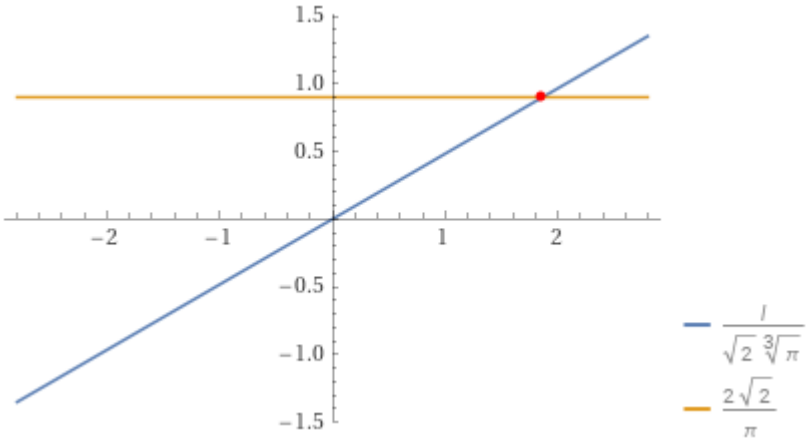
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

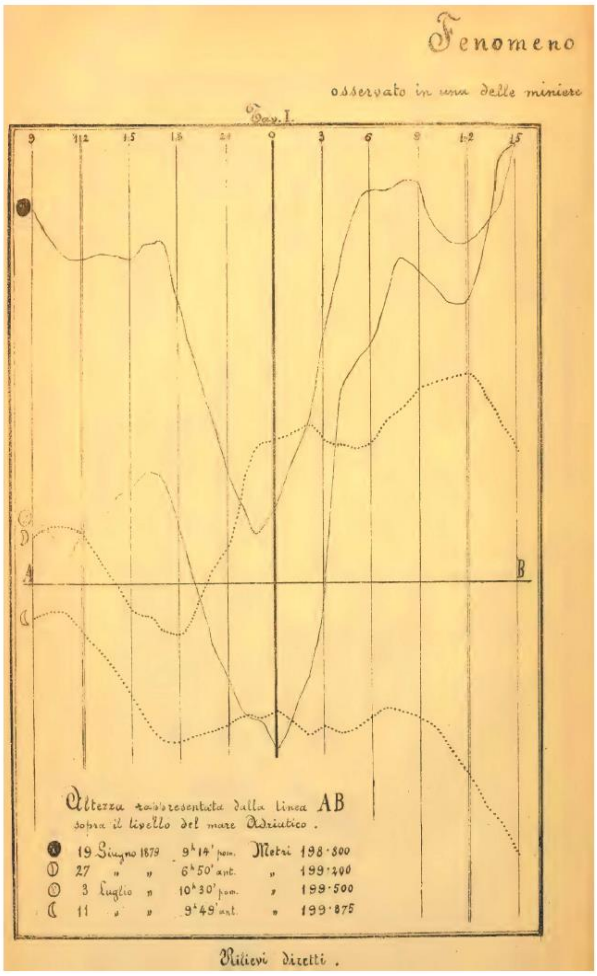
Plot

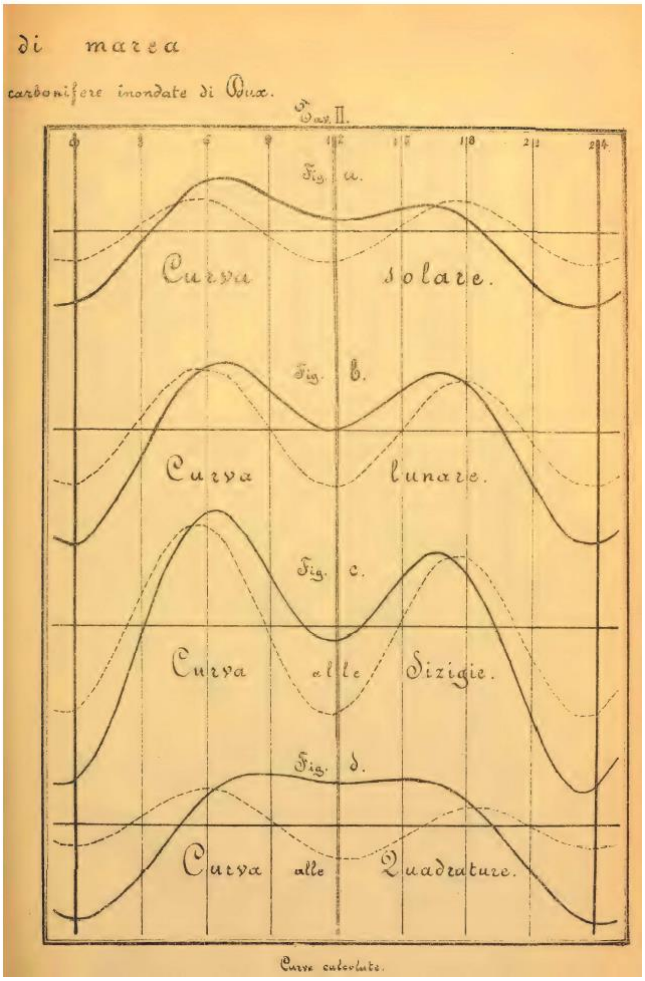


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

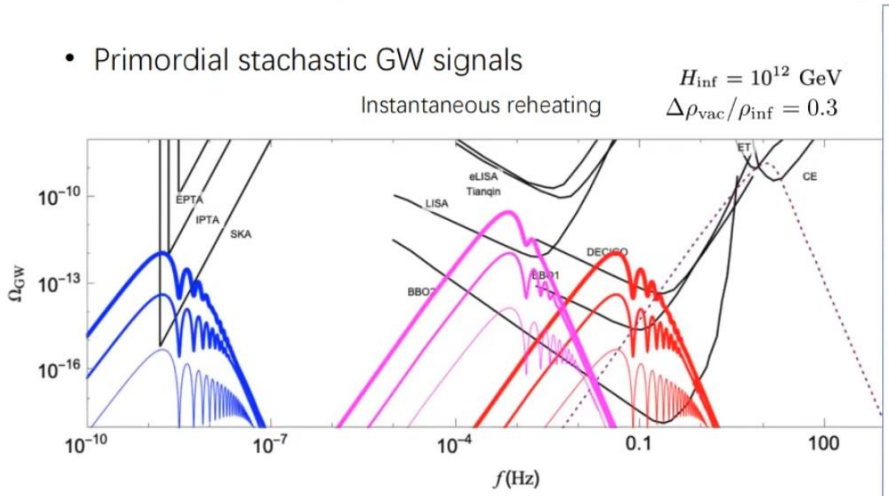

di marea
carbonifere inondate di Pux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

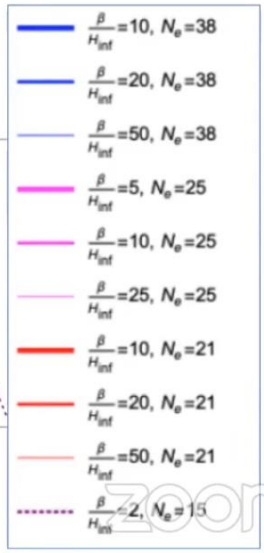
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

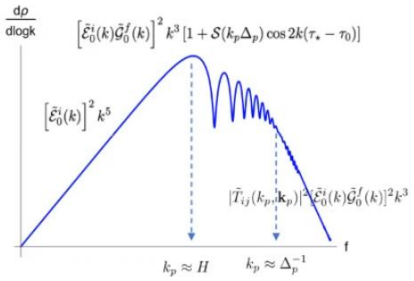
Comparison between primary GW and secondary GW

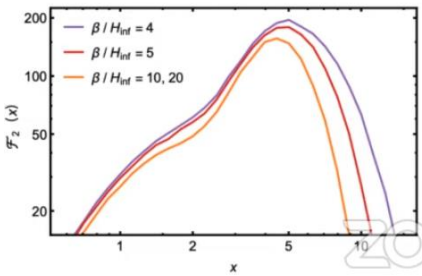
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





From

“**Sulle osservazioni mareografiche in Italia e specialmente su quelle fatte ad Ischia**” – *Prof. Giulio Grablovitz*

We analyze the following equation:

$$N = s - \frac{1}{2} S + S C;$$

$$N = q - \frac{1}{2} Q + Q C;$$

We consider:

(s-1/2*S + S*C) + (q – 1/2*Q + Q*C)

Input

$$\left(s - \frac{1}{2} S + S C\right) + \left(q - \frac{1}{2} Q + Q C\right)$$

Result

$$C Q + C S + q - \frac{Q}{2} + s - \frac{S}{2}$$

Geometric figure

line

Alternate forms

$$\frac{1}{2} (2 C Q + 2 C S + 2 q - Q + 2 s - S)$$

$$\left(C-\frac{1}{2}\right)Q+\left(C-\frac{1}{2}\right)S+q+s$$

$$\frac{1}{2}\left(C\left(2Q+2S\right)+2q-Q+2s-S\right)$$

Roots

$$2C-1\neq 0,\quad S=\frac{-2CQ-2q+Q-2s}{2C-1}$$

$$C=\frac{1}{2},\quad s=-q$$

Real root

$$C=\frac{1}{2},\quad s=-q$$

Integer roots

$$C=n_1,\quad q=n_2,\quad Q=2n_3,\quad s=-n_2-2n_1n_3+n_3-2n_1n_4+n_4,$$
$$S=2n_4,\quad n_1\in\mathbb{Z},\quad n_2\in\mathbb{Z},\quad n_3\in\mathbb{Z},\quad n_4\in\mathbb{Z}$$

$$C=n_1,\quad q=n_2,\quad Q=2n_3+1,$$
$$s=-2n_3n_1-2n_4n_1-2n_1-n_2+n_3+n_4+1,$$
$$S=2n_4+1,\quad n_1\in\mathbb{Z},\quad n_2\in\mathbb{Z},\quad n_3\in\mathbb{Z},\quad n_4\in\mathbb{Z}$$

$\mathbb{Z}$ is the set of integers

Derivative

$$\frac{\partial}{\partial s}\left(\left(s-\frac{S}{2}+SC\right)+\left(q-\frac{Q}{2}+QC\right)\right)=1$$

Indefinite integral

$$\int\left(q-\frac{Q}{2}+C\,Q+s-\frac{S}{2}+C\,S\right)ds=\left(C-\frac{1}{2}\right)Q\,s+\left(C-\frac{1}{2}\right)s\,S+q\,s+\frac{s^2}{2}+\text{constant}$$

Definite integral over a hypercube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L}\left(q-\frac{Q}{2}+C\,Q+s-\frac{S}{2}+C\,S\right)dS\,ds\,dQ\,dq\,dC=0$$

From the indefinite integral result

$$\int\left(q-\frac{Q}{2}+C\,Q+s-\frac{S}{2}+C\,S\right)ds=\left(C-\frac{1}{2}\right)Q\,s+\left(C-\frac{1}{2}\right)s\,S+q\,s+\frac{s^2}{2}+\text{constant}$$

we obtain:

q s + (-1/2 + C) Q s + s^2/2 + (-1/2 + C) s S

Input

$$q\,s+\left(-\frac{1}{2}+C\right)Q\,s+\frac{s^2}{2}+\left(-\frac{1}{2}+C\right)s\,S$$

Geometric figure

parabola

Alternate forms

$$\frac{1}{2}\,s\,(2\,C\,Q+2\,C\,S+2\,q-Q+s-S)$$

$$\frac{1}{8}\left(-4\,C^2\,Q^2-8\,C^2\,Q\,S-4\,C^2\,S^2-8\,C\,q\,Q-8\,C\,q\,S+4\,C\,Q^2+8\,C\,Q\,S+4\,C\,S^2-4\right.$$
$$\left.q^2+4\,q\,Q+4\,q\,S-Q^2-2\,Q\,S-S^2\right)+\frac{1}{8}\,(2\,C\,Q+2\,C\,S+2\,q-Q+2\,s-S)^2$$

$$C\,(Q\,s+s\,S)+q\,s+s\left(\frac{s}{2}-\frac{Q}{2}\right)-\frac{s\,S}{2}$$

Expanded form

$$C\,Q\,s+C\,s\,S+q\,s-\frac{Q\,s}{2}+\frac{s^2}{2}-\frac{s\,S}{2}$$

Roots

$$2\,C-1\neq 0,\quad S=\frac{-2\,C\,Q-2\,q+Q-s}{2\,C-1}$$

$$C=\frac{1}{2},\quad s=-2\,q$$

Real root

$$s=0$$

Integer root

$$s=-2\,C\,Q-2\,C\,S-2\,q+Q+S$$

Polynomial discriminant

$$\Delta_s=\frac{1}{4}\,(2\,C\,Q+2\,C\,S+2\,q-Q-S)^2$$

Derivative

$$\frac{\partial}{\partial s}\left(q\,s+\left(-\frac{1}{2}+C\right)Q\,s+\frac{s^2}{2}+\left(-\frac{1}{2}+C\right)s\,S\right)=\left(C-\frac{1}{2}\right)Q+\left(C-\frac{1}{2}\right)S+q+s$$

Indefinite integral

$$\int\left(q\,s+\left(-\frac{1}{2}+C\right)Q\,s+\frac{s^2}{2}+\left(-\frac{1}{2}+C\right)s\,S\right)ds=$$
$$\frac{1}{12}\,s^2\,((6\,C-3)\,Q+6\,C\,S+6\,q+2\,s-3\,S)+\text{constant}$$

Again, from the indefinite integral result

$$\int\left(q\,s+\left(-\frac{1}{2}+C\right)Q\,s+\frac{s^2}{2}+\left(-\frac{1}{2}+C\right)s\,S\right)ds=$$
$$\frac{1}{12}\,s^2\,((6\,C-3)\,Q+6\,C\,S+6\,q+2\,s-3\,S)+\text{constant}$$

we obtain:

1/12 s^2 (6 q + (-3 + 6 C) Q + 2 s - 3 S + 6 C S)

Input

$$\frac{1}{12}\,s^2\,(6\,q+(-3+6\,C)\,Q+2\,s-3\,S+6\,C\,S)$$

Alternate forms

$$\frac{1}{12}\,s^2\,(6\,C\,Q+6\,C\,S+6\,q-3\,Q+2\,s-3\,S)$$

$$\left(\frac{C}{2}-\frac{1}{4}\right)Q\,s^2+s^2\left(\left(\frac{C}{2}-\frac{1}{4}\right)S+\frac{s}{6}\right)+\frac{q\,s^2}{2}$$

$$\frac{1}{12} s^2 (6 C (Q + S) + 6 q - 3 Q + 2 s - 3 S)$$

Expanded form

$$\frac{1}{2} C Q s^2 + \frac{1}{2} C s^2 S + \frac{q s^2}{2} - \frac{Q s^2}{4} + \frac{s^3}{6} - \frac{s^2 S}{4}$$

Alternate form assuming C, q, Q, s, and S are positive

$$\frac{1}{12} (6 C - 3) Q s^2 + \frac{1}{2} C s^2 S + \frac{q s^2}{2} + \frac{s^3}{6} - \frac{s^2 S}{4}$$

Roots

$$2 C - 1 \neq 0, \quad S = \frac{-6 C Q - 6 q + 3 Q - 2 s}{3 (2 C - 1)}$$

$$C = \frac{1}{2}, \quad s = -3 q$$

Real root

$$s = 0$$

Integer roots

$$C = n_1, \quad q = n_2, \quad Q = 2 n_3, \quad s = -3 n_2 - 6 n_1 n_3 + 3 n_3 - 6 n_1 n_4 + 3 n_4,$$
$$S = 2 n_4, \quad n_1 \in \mathbb{Z}, \quad n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}$$

$$C = n_1, \quad q = n_2, \quad Q = 2 n_3 + 1,$$
$$s = -6 n_3 n_1 - 6 n_4 n_1 - 6 n_1 - 3 n_2 + 3 n_3 + 3 n_4 + 3,$$
$$S = 2 n_4 + 1, \quad n_1 \in \mathbb{Z}, \quad n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}$$

$\mathbb{Z}$ is the set of integers

Polynomial discriminant

$$\Delta = 0$$

Derivative

$$\frac{\partial}{\partial s}\left(\frac{1}{12} s^2 (6q + (-3 + 6C) Q + 2s - 3S + 6CS)\right) =$$
$$\frac{1}{2} s ((2C - 1) Q + 2CS + 2q + s - S)$$

Indefinite integral

$$\int \frac{1}{12} s^2 (6q + (-3 + 6C) Q + 2s - 3S + 6CS)\, ds =$$
$$\frac{1}{24} s^3 ((4C - 2) Q + 4CS + 4q + s - 2S) + \text{constant}$$

From the indefinite integral result

$$\int \frac{1}{12} s^2 (6q + (-3 + 6C) Q + 2s - 3S + 6CS)\, ds =$$
$$\frac{1}{24} s^3 ((4C - 2) Q + 4CS + 4q + s - 2S) + \text{constant}$$

1/24 s^3 (4 q + (-2 + 4 C) Q + s - 2 S + 4 C S)

for q = 2, s = 4, C = 8, Q = 16 and S = 32:

1/24 4^3 (4*2 + (-2 + 4*8) 16 + 4 – 2*32 + 4*8*32)

Input

$$\frac{1}{24} \times 4^3 (4 \times 2 + (-2 + 4 \times 8) \times 16 + 4 - 2 \times 32 + 4 \times 8 \times 32)$$

Exact result

3872

3872

From which:

1/24 4^3 (4*2 + (-2 + 4*8) 16 + 4 – 2*32 + 4*8*32)+233-5-4

Input

$$\frac{1}{24}\times 4^3\,(4\times 2+(-2+4\times 8)\times 16+4-2\times 32+4\times 8\times 32)+233-5-4$$

Exact result

4096

4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry.

Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

27*sqrt(1/24 4^3 (4*2 + (-2 + 4*8) 16 + 4 – 2*32 + 4*8*32)+233-5-4)+1

Input

$$27\sqrt{\frac{1}{24}\times 4^3\,(4\times 2+(-2+4\times 8)\times 16+4-2\times 32+4\times 8\times 32)+233-5-4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(27*sqrt(1/24 4^3 (4*2 + (-2 + 4*8) 16 + 4 – 2*32 + 4*8*32)+233-5-4)+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\left(27\sqrt{\left(\frac{1}{24}\times 4^3\,(4\times 2+(-2+4\times 8)\times 16+4-2\times 32+4\times 8\times 32)+233-5-4\right)}+1\right)\,\hat{}\,(1/15)+{C_{\text{MRB}}}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Exact result

$${C_{\text{MRB}}}^{1-1/(4\pi)+\pi}+\sqrt[15]{1729}$$

Decimal approximation

1.64493802413026025794173319194636695742024244172581638027130567 82

…

1.64493802413…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate form

$C_{MRB}^{-1/(4\pi)}\left(\sqrt[15]{1729}\ \sqrt[4\pi]{C_{MRB}}+C_{MRB}^{1+\pi}\right)$

Now, we analyze the following equation:

$$C = \frac{1}{2} - \frac{s-q}{S-Q}.$$

We consider:

(1/2-(s-q)/(S-Q))

Input

$$\frac{1}{2} - \frac{s-q}{S-Q}$$

Alternate forms

$$\frac{2q-Q-2s+S}{2(S-Q)}$$

$$\frac{s-q}{Q-S} + \frac{1}{2}$$

$$-\frac{2q-Q-2s+S}{2(Q-S)}$$

Expanded form

$$\frac{q}{S-Q}-\frac{s}{S-Q}+\frac{1}{2}$$

Root

$S=-2q+Q+2s\,,\quad q-s\neq 0$

Integer roots

$q=n_1-n_2-n_3-n_4-n_5-1\,,\quad Q=-2n_2-n_3+n_6-2n_7-n_8-n_9-2\,,$
$s=n_1-n_5+n_7+n_8+n_{10}\,,\quad S=n_3+2n_4+n_6+n_8-n_9+2n_{10}\,,$
$n_1\in\mathbb{Z}\,,\quad n_2\in\mathbb{Z}\,,\quad n_3\in\mathbb{Z}\,,\quad n_4\in\mathbb{Z}\,,\quad n_5\in\mathbb{Z}\,,\quad n_6\in\mathbb{Z}\,,$
$n_7\in\mathbb{Z}\,,\quad n_8\in\mathbb{Z}\,,\quad n_9\in\mathbb{Z}\,,\quad n_{10}\in\mathbb{Z}\,,\quad n_1\geq 0\,,\quad n_2\geq 0\,,\quad n_3\geq 0\,,$
$n_4\geq 0\,,\quad n_5\geq 0\,,\quad n_6\geq 0\,,\quad n_7\geq 0\,,\quad n_8\geq 0\,,\quad n_9\geq 0\,,\quad n_{10}\geq 0$

$q=n_1-n_2-n_3-n_4-n_5-1\,,\quad Q=-2n_2-n_3+n_6-2n_7-n_8-n_9-1\,,$
$s=n_1-n_5+n_7+n_8+n_{10}\,,\quad S=n_3+2n_4+n_6+n_8-n_9+2n_{10}+1\,,$
$n_1\in\mathbb{Z}\,,\quad n_2\in\mathbb{Z}\,,\quad n_3\in\mathbb{Z}\,,\quad n_4\in\mathbb{Z}\,,\quad n_5\in\mathbb{Z}\,,\quad n_6\in\mathbb{Z}\,,$
$n_7\in\mathbb{Z}\,,\quad n_8\in\mathbb{Z}\,,\quad n_9\in\mathbb{Z}\,,\quad n_{10}\in\mathbb{Z}\,,\quad n_1\geq 0\,,\quad n_2\geq 0\,,\quad n_3\geq 0\,,$
$n_4\geq 0\,,\quad n_5\geq 0\,,\quad n_6\geq 0\,,\quad n_7\geq 0\,,\quad n_8\geq 0\,,\quad n_9\geq 0\,,\quad n_{10}\geq 0$

$q=n_1-n_2-n_3-n_4-n_5-1\,,\quad Q=-2n_2-n_3+n_6-2n_7-n_8-n_9\,,$
$s=n_1-n_5+n_7+n_8+n_{10}\,,\quad S=n_3+2n_4+n_6+n_8-n_9+2n_{10}+2\,,$
$n_1\in\mathbb{Z}\,,\quad n_2\in\mathbb{Z}\,,\quad n_3\in\mathbb{Z}\,,\quad n_4\in\mathbb{Z}\,,\quad n_5\in\mathbb{Z}\,,\quad n_6\in\mathbb{Z}\,,$
$n_7\in\mathbb{Z}\,,\quad n_8\in\mathbb{Z}\,,\quad n_9\in\mathbb{Z}\,,\quad n_{10}\in\mathbb{Z}\,,\quad n_1\geq 0\,,\quad n_2\geq 0\,,\quad n_3\geq 0\,,$
$n_4\geq 0\,,\quad n_5\geq 0\,,\quad n_6\geq 0\,,\quad n_7\geq 0\,,\quad n_8\geq 0\,,\quad n_9\geq 0\,,\quad n_{10}\geq 0$

$$q = n_1 - n_2 - n_3 - n_4 - n_5\,, \quad Q = -2\,n_2 - n_3 + n_6 - 2\,n_7 - n_8 - n_9 - 2\,,$$
$$s = n_1 - n_5 + n_7 + n_8 + n_{10} + 1\,, \quad S = n_3 + 2\,n_4 + n_6 + n_8 - n_9 + 2\,n_{10}\,,$$
$$n_1 \in \mathbb{Z}\,, \quad n_2 \in \mathbb{Z}\,, \quad n_3 \in \mathbb{Z}\,, \quad n_4 \in \mathbb{Z}\,, \quad n_5 \in \mathbb{Z}\,, \quad n_6 \in \mathbb{Z}\,,$$
$$n_7 \in \mathbb{Z}\,, \quad n_8 \in \mathbb{Z}\,, \quad n_9 \in \mathbb{Z}\,, \quad n_{10} \in \mathbb{Z}\,, \quad n_1 \geq 0\,, \quad n_2 \geq 0\,, \quad n_3 \geq 0\,,$$
$$n_4 \geq 0\,, \quad n_5 \geq 0\,, \quad n_6 \geq 0\,, \quad n_7 \geq 0\,, \quad n_8 \geq 0\,, \quad n_9 \geq 0\,, \quad n_{10} \geq 0$$

$$q = n_1 - n_2 - n_3 - n_4 - n_5\,, \quad Q = -2\,n_2 - n_3 + n_6 - 2\,n_7 - n_8 - n_9 - 1\,,$$
$$s = n_1 - n_5 + n_7 + n_8 + n_{10} + 1\,, \quad S = n_3 + 2\,n_4 + n_6 + n_8 - n_9 + 2\,n_{10} + 1\,,$$
$$n_1 \in \mathbb{Z}\,, \quad n_2 \in \mathbb{Z}\,, \quad n_3 \in \mathbb{Z}\,, \quad n_4 \in \mathbb{Z}\,, \quad n_5 \in \mathbb{Z}\,, \quad n_6 \in \mathbb{Z}\,,$$
$$n_7 \in \mathbb{Z}\,, \quad n_8 \in \mathbb{Z}\,, \quad n_9 \in \mathbb{Z}\,, \quad n_{10} \in \mathbb{Z}\,, \quad n_1 \geq 0\,, \quad n_2 \geq 0\,, \quad n_3 \geq 0\,,$$
$$n_4 \geq 0\,, \quad n_5 \geq 0\,, \quad n_6 \geq 0\,, \quad n_7 \geq 0\,, \quad n_8 \geq 0\,, \quad n_9 \geq 0\,, \quad n_{10} \geq 0$$

$\mathbb{Z}$ is the set of integers

Derivative

$$\frac{\partial}{\partial s}\left(\frac{1}{2} - \frac{s-q}{S-Q}\right) = \frac{1}{Q-S}$$

Indefinite integral

$$\int\left(\frac{1}{2} - \frac{s-q}{S-Q}\right) ds = -\frac{q\,s}{Q-S} + \frac{s^2}{2\,(Q-S)} + \frac{s}{2} + \text{constant}$$

Series representations

$$\frac{1}{2} - \frac{-q+s}{-Q+S} = \frac{2\,q - 2\,s + S}{2\,S} + \sum_{n=1}^{\infty} Q^n\,(q-s)\,S^{-1-n}$$

$$\frac{1}{2} - \frac{-q+s}{-Q+S} = \frac{-2\,q + Q + 2\,s}{2\,Q} + \sum_{n=1}^{\infty} S^n\,Q^{-1-n}\,(-q+s)$$

$$\frac{1}{2}-\frac{-q+s}{-Q+S}=\frac{-1-2q+Q+2s}{2(-1+Q)}+\sum_{n=1}^{\infty}(-1+S)^{n}(-1+Q)^{-1-n}(-q+s)$$

$$\frac{1}{2}-\frac{-q+s}{-Q+S}=\sum_{n=-\infty}^{\infty}\left(\begin{cases}\frac{-1+2q-2s+S}{2(-1+S)} & n=0\\ (q-s)(-1+S)^{-1-n} & n>0\end{cases}\right)(-1+Q)^{n}$$

From the indefinite integral result

$$\int\left(\frac{1}{2}-\frac{s-q}{S-Q}\right)ds=-\frac{q\,s}{Q-S}+\frac{s^2}{2(Q-S)}+\frac{s}{2}+\text{constant}$$

we obtain:

s/2 - (q s)/(Q - S) + s^2/(2 (Q - S))

Input

$$\frac{s}{2}-\frac{q\,s}{Q-S}+\frac{s^2}{2(Q-S)}$$

Alternate forms

$$\frac{s(-2q+Q+s-S)}{2(Q-S)}$$

$$-\frac{s(2q-Q-s+S)}{2(Q-S)}$$

Roots

$$s=0,\quad Q-S\neq 0$$

$$S=-2q+Q+s,\quad 2q-s\neq 0$$

Integer roots

$$s = 0, \quad Q = n_1 - n_2 - n_3 - 1, \quad S = n_1 - n_3 + n_4, \quad n_1 \in \mathbb{Z},$$
$$n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0, \quad n_4 \geq 0$$

$$s = 0, \quad Q = n_1 - n_2 - n_3, \quad S = n_1 - n_3 + n_4 + 1, \quad n_1 \in \mathbb{Z},$$
$$n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0, \quad n_4 \geq 0$$

$$s = 0, \quad Q = n_1 + n_2 - n_3 + 1, \quad S = n_2 - n_3 - n_4, \quad n_1 \in \mathbb{Z},$$
$$n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0, \quad n_4 \geq 0$$

$$s = 0, \quad Q = n_1 + n_2 - n_3, \quad S = n_2 - n_3 - n_4 - 1, \quad n_1 \in \mathbb{Z},$$
$$n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0, \quad n_4 \geq 0$$

$$q = n_1 - n_2 - n_3 - n_4 - n_5 - n_6 - n_7 - 1,$$
$$Q = -n_2 - 2n_3 - n_4 + n_8 - n_9 - n_{10} - 1,$$
$$s = 2n_1 - n_2 - n_5 - 2n_6 + n_9 + n_{11} - 1, \quad S = n_4 + n_5 + 2n_7 + n_8 - n_{10} + n_{11},$$
$$n_1 \in \mathbb{Z}, \quad n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_5 \in \mathbb{Z}, \quad n_6 \in \mathbb{Z}, \quad n_7 \in \mathbb{Z},$$
$$n_8 \in \mathbb{Z}, \quad n_9 \in \mathbb{Z}, \quad n_{10} \in \mathbb{Z}, \quad n_{11} \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0,$$
$$n_4 \geq 0, \quad n_5 \geq 0, \quad n_6 \geq 0, \quad n_7 \geq 0, \quad n_8 \geq 0, \quad n_9 \geq 0, \quad n_{10} \geq 0, \quad n_{11} \geq 0$$

$\mathbb{Z}$ is the set of integers

Derivative

$$\frac{\partial}{\partial s}\left(\frac{s}{2} - \frac{q\,s}{Q-S} + \frac{s^2}{2\,(Q-S)}\right) = \frac{-2\,q + (Q-S) + 2\,s}{2\,(Q-S)}$$

Indefinite integral

$$\int\left(\frac{s}{2} - \frac{q\,s}{Q-S} + \frac{s^2}{2\,(Q-S)}\right) ds = \frac{s^2\,(-6\,q + 3\,Q + 2\,s - 3\,S)}{12\,(Q-S)} + \text{constant}$$

Series representations

$$\frac{s}{2}-\frac{q\,s}{Q-S}+\frac{s^2}{2\,(Q-S)}=\frac{s\,(-2\,q+Q+s)}{2\,Q}+\sum_{n=1}^{\infty}\frac{1}{2}\,S^n\left(Q^{-1-n}\,s\,(-2\,q+s)\right)$$

$$\frac{s}{2}-\frac{q\,s}{Q-S}+\frac{s^2}{2\,(Q-S)}=\frac{s\,(2\,q-s+S)}{2\,S}+\sum_{n=1}^{\infty}\frac{1}{2}\,Q^n\left((2\,q-s)\,s\,S^{-1-n}\right)$$

$$\frac{s}{2}-\frac{q\,s}{Q-S}+\frac{s^2}{2\,(Q-S)}=$$
$$\frac{s\,(-1-2\,q+Q+s)}{2\,(-1+Q)}+\sum_{n=1}^{\infty}\frac{1}{2}\,(-1+S)^n\left((-1+Q)^{-1-n}\,s\,(-2\,q+s)\right)$$

$$\frac{s}{2}-\frac{q\,s}{Q-S}+\frac{s^2}{2\,(Q-S)}=\sum_{n=-\infty}^{\infty}\left(\begin{cases}\frac{s\,(-1+2\,q-s+S)}{2\,(-1+S)} & n=0\\ \frac{1}{2}\,(2\,q-s)\,s\,(-1+S)^{-1-n} & n>0\end{cases}\right)(-1+Q)^n$$

Again, from the indefinite integral result

$$\int\left(\frac{s}{2}-\frac{q\,s}{Q-S}+\frac{s^2}{2\,(Q-S)}\right)ds=\frac{s^2\,(-6\,q+3\,Q+2\,s-3\,S)}{12\,(Q-S)}+\text{constant}$$

we obtain:

(s^2 (-6 q + 3 Q + 2 s - 3 S))/(12 (Q - S))

Input

$$\frac{s^2\,(-6\,q+3\,Q+2\,s-3\,S)}{12\,(Q-S)}$$

Result

$$\frac{s^2(-6q+3Q+2s-3S)}{12(Q-S)}$$

Alternate forms

$$-\frac{6\times\frac{1}{12}qs^2}{Q-S}+\frac{2\times\frac{1}{12}s^3}{Q-S}-\frac{3\times\frac{1}{12}s^2S}{Q-S}+\frac{3\times\frac{1}{12}Qs^2}{Q-S}$$

$$-\frac{s^2(6q-3Q-2s+3S)}{12(Q-S)}$$

$$\frac{s^2(-6q+3Q+2s-3S)}{12Q-12S}$$

Expanded forms

$$-\frac{qs^2}{2(Q-S)}+\frac{s^3}{6Q-6S}-\frac{s^2S}{4(Q-S)}+\frac{Qs^2}{4(Q-S)}$$

$$\frac{-6qs^2+3Qs^2+2s^3-3s^2S}{12Q-12S}$$

Roots

$$s=0,\quad Q-S\neq 0$$

$$S=\frac{1}{3}(-6q+3Q+2s),\quad 3q-s\neq 0$$

Integer roots

$$s = 0, \quad Q = n_1 - n_2 - n_3 - 1, \quad S = n_1 - n_3 + n_4, \quad n_1 \in \mathbb{Z},$$
$$n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0, \quad n_4 \geq 0$$

$$s = 0, \quad Q = n_1 - n_2 - n_3, \quad S = n_1 - n_3 + n_4 + 1, \quad n_1 \in \mathbb{Z},$$
$$n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0, \quad n_4 \geq 0$$

$$s = 0, \quad Q = n_1 + n_2 - n_3 + 1, \quad S = n_2 - n_3 - n_4, \quad n_1 \in \mathbb{Z},$$
$$n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0, \quad n_4 \geq 0$$

$$s = 0, \quad Q = n_1 + n_2 - n_3, \quad S = n_2 - n_3 - n_4 - 1, \quad n_1 \in \mathbb{Z},$$
$$n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0, \quad n_4 \geq 0$$

$$q = n_1 - n_2 - n_3 - n_4 - n_5 - 1, \quad Q = -2n_2 - n_3 + n_6 - 2n_7 - n_8 - n_9 - 2,$$
$$s = 3(n_1 - n_4 + n_7 + n_8 + n_{10}), \quad S = n_3 + 2n_5 + n_6 + n_8 - n_9 + 2n_{10},$$
$$n_1 \in \mathbb{Z}, \quad n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_5 \in \mathbb{Z}, \quad n_6 \in \mathbb{Z},$$
$$n_7 \in \mathbb{Z}, \quad n_8 \in \mathbb{Z}, \quad n_9 \in \mathbb{Z}, \quad n_{10} \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0,$$
$$n_4 \geq 0, \quad n_5 \geq 0, \quad n_6 \geq 0, \quad n_7 \geq 0, \quad n_8 \geq 0, \quad n_9 \geq 0, \quad n_{10} \geq 0$$

$\mathbb{Z}$ is the set of integers

Derivative

$$\frac{\partial}{\partial s}\left(\frac{s^2(-6q + 3Q + 2s - 3S)}{12(Q - S)}\right) = \frac{s(-2q + (Q - S) + s)}{2(Q - S)}$$

Indefinite integral

$$\int \frac{s^2(-6q + 3Q + 2s - 3S)}{12(Q - S)}\, ds = \frac{s^3(-2q + Q - S) + \frac{s^4}{2}}{12(Q - S)} + \text{constant}$$

Series representations

$$\frac{s^2(-6q+3Q+2s-3S)}{12(Q-S)} = \frac{s^2(-6q+3Q+2s)}{12Q} + \sum_{n=1}^{\infty} \frac{1}{6} S^n \left(Q^{-1-n} s^2 (-3q+s)\right)$$

$$\frac{s^2(-6q+3Q+2s-3S)}{12(Q-S)} = \frac{s^2(6q-2s+3S)}{12S} + \sum_{n=1}^{\infty} \frac{1}{6} Q^n \left((3q-s) s^2 S^{-1-n}\right)$$

$$\frac{s^2(-6q+3Q+2s-3S)}{12(Q-S)} = \frac{s^2(-3-6q+3Q+2s)}{12(-1+Q)} + \sum_{n=1}^{\infty} \frac{1}{6} (-1+S)^n \left((-1+Q)^{-1-n} s^2 (-3q+s)\right)$$

From the indefinite integral result

$$\int \frac{s^2(-6q+3Q+2s-3S)}{12(Q-S)}\, ds = \frac{s^3(-2q+Q-S)+\frac{s^4}{2}}{12(Q-S)} + \text{constant}$$

we obtain:

(s^4/2 + s^3 (-2 q + Q - S))/(12 (Q - S))

Input

$$\frac{\frac{s^4}{2} + s^3(-2q+Q-S)}{12(Q-S)}$$

Result

$$\frac{s^3(-2q+Q-S)+\frac{s^4}{2}}{12(Q-S)}$$

Alternate forms

$$\frac{s^3 (-4q + 2Q + s - 2S)}{24 (Q - S)}$$

$$-\frac{s^3 (4q - 2Q - s + 2S)}{24 (Q - S)}$$

$$\frac{s^3 (2Q + s - 2S) - 4q s^3}{24Q - 24S}$$

Expanded forms

$$-\frac{q s^3}{6 (Q - S)} + \frac{s^4}{24 (Q - S)} - \frac{s^3 S}{12 (Q - S)} + \frac{Q s^3}{12 (Q - S)}$$

$$\frac{-4q s^3 + 2Q s^3 + s^4 - 2s^3 S}{24Q - 24S}$$

Alternate form assuming q, Q, s, and S are positive

$$\frac{s^3 (-2q + Q - S)}{12 (Q - S)} + \frac{s^4}{24 (Q - S)}$$

Roots

$$s = 0, \quad Q - S \neq 0$$

$$S = \frac{1}{2} (-4q + 2Q + s), \quad 4q - s \neq 0$$

Integer roots

$$s = 0, \quad Q = n_1 - n_2 - n_3 - 1, \quad S = n_1 - n_3 + n_4, \quad n_1 \in \mathbb{Z},$$
$$n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0, \quad n_4 \geq 0$$

$$s = 0, \quad Q = n_1 - n_2 - n_3, \quad S = n_1 - n_3 + n_4 + 1, \quad n_1 \in \mathbb{Z},$$
$$n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0, \quad n_4 \geq 0$$

$$s = 0, \quad Q = n_1 + n_2 - n_3 + 1, \quad S = n_2 - n_3 - n_4, \quad n_1 \in \mathbb{Z},$$
$$n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0, \quad n_4 \geq 0$$

$$s = 0, \quad Q = n_1 + n_2 - n_3, \quad S = n_2 - n_3 - n_4 - 1, \quad n_1 \in \mathbb{Z},$$
$$n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0, \quad n_4 \geq 0$$

$$q = n_1 - n_2 - n_3 - n_4 - n_5 - n_6 - n_7 - 1,$$
$$Q = -2n_2 - n_3 - n_4 + n_8 - n_9 - n_{10} - 2,$$
$$s = 2(2n_1 - n_3 - 2n_5 - n_6 + n_9 + n_{11}), \quad S = n_4 + n_6 + 2n_7 + n_8 - n_{10} + n_{11},$$
$$n_1 \in \mathbb{Z}, \quad n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_4 \in \mathbb{Z}, \quad n_5 \in \mathbb{Z}, \quad n_6 \in \mathbb{Z}, \quad n_7 \in \mathbb{Z},$$
$$n_8 \in \mathbb{Z}, \quad n_9 \in \mathbb{Z}, \quad n_{10} \in \mathbb{Z}, \quad n_{11} \in \mathbb{Z}, \quad n_1 \geq 0, \quad n_2 \geq 0, \quad n_3 \geq 0,$$
$$n_4 \geq 0, \quad n_5 \geq 0, \quad n_6 \geq 0, \quad n_7 \geq 0, \quad n_8 \geq 0, \quad n_9 \geq 0, \quad n_{10} \geq 0, \quad n_{11} \geq 0$$

$\mathbb{Z}$ is the set of integers

Derivative

$$\frac{\partial}{\partial s}\left(\frac{\frac{s^4}{2} + s^3(-2q + Q - S)}{12(Q - S)}\right) = \frac{s^2(-6q + 3Q + 2s - 3S)}{12(Q - S)}$$

Indefinite integral

$$\int \frac{\frac{s^4}{2} + s^3(-2q + Q - S)}{12(Q - S)}\, ds = \frac{s^4(-10q + 5Q + 2s - 5S)}{240(Q - S)} + \text{constant}$$

Series representations

$$\frac{\frac{s^4}{2}+s^3(-2q+Q-S)}{12(Q-S)}=\frac{s^3(-4q+2Q+s)}{24Q}+\sum_{n=1}^{\infty}\frac{1}{24}S^n\left(Q^{-1-n}s^3(-4q+s)\right)$$

$$\frac{\frac{s^4}{2}+s^3(-2q+Q-S)}{12(Q-S)}=-\frac{s^3(-4q+s-2S)}{24S}+\sum_{n=1}^{\infty}\frac{1}{24}Q^n\left((4q-s)s^3S^{-1-n}\right)$$

$$\frac{\frac{s^4}{2}+s^3(-2q+Q-S)}{12(Q-S)}=$$
$$\frac{s^3(-2-4q+2Q+s)}{24(-1+Q)}+\sum_{n=1}^{\infty}\frac{1}{24}(-1+S)^n\left((-1+Q)^{-1-n}s^3(-4q+s)\right)$$

From the indefinite integral result

$$\int\frac{\frac{s^4}{2}+s^3(-2q+Q-S)}{12(Q-S)}\,ds=\frac{s^4(-10q+5Q+2s-5S)}{240(Q-S)}+\text{constant}$$

(s^4 (-10 q + 5 Q + 2 s - 5 S))/(240 (Q - S))

for q = 2, s = 4, Q = 8 and S = 16:

(4^4 (-10*2 + 5*8 + 2*4 – 5*16))/(240 (8 - 16))

Input

$$\frac{4^4(-10\times2+5\times8+2\times4-5\times16)}{240(8-16)}$$

Exact result

$$\frac{104}{15}$$

Decimal approximation

6.933333333333333333333333333333333333333333333333333333333333333333333333333

…

6.9333333….

Repeating decimal

$6.9\overline{3}$ (period 1)

From which:

16*15((4^4 (-10*2 + 5*8 + 2*4 – 5*16))/(240 (8 - 16)))+64+1

Input

$$16 \times 15 \times \frac{4^4 (-10 \times 2 + 5 \times 8 + 2 \times 4 - 5 \times 16)}{240 (8 - 16)} + 64 + 1$$

Result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number).

Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(1/27(16*15((4^4 (-10*2 + 5*8 + 2*4 – 5*16))/(240 (8 - 16)))+64))^2

Input

$$\left(\frac{1}{27}\left(16\times 15\times \frac{4^4\,(-10\times 2+5\times 8+2\times 4-5\times 16)}{240\,(8-16)}+64\right)\right)^2$$

Exact result

4096

4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

(16*15((4^4 (-10*2 + 5*8 + 2*4 – 5*16))/(240 (8 - 16)))+64+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{16\times 15\times \frac{4^4\,(-10\times 2+5\times 8+2\times 4-5\times 16)}{240\,(8-16)}+64+1}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Exact result

$$C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}+\sqrt[15]{1729}$$

Decimal approximation

1.644938024130260257941733191946366957420242441725816380271305678 2

…

1.64493802413…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate form

$$C_{\text{MRB}}{}^{-1/(4\pi)}\left(\sqrt[15]{1729}\;\sqrt[4\pi]{C_{\text{MRB}}}+C_{\text{MRB}}{}^{1+\pi}\right)$$

Now, we analyze the following equation:

$$P^2 - 2PC = -R^2$$

We consider:

(P^2 – 2*P*C+R^2)

Input

$$P^2-2\,P\,C+R^2$$

Geometric figure

line

Alternate form

$P\,(P - 2\,C) + R^2$

Roots

$R = \sqrt{P}\,\left(-\sqrt{2\,C - P}\right)$

$R = \sqrt{P}\,\sqrt{2\,C - P}$

Integer roots

$C = n_1\left(n_2^2 - n_3^2\right), \quad P = 2\,n_1\,n_2^2,$
$R = 2\,n_1\,n_2\,n_3, \quad n_1 \in \mathbb{Z}, \quad n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_3 \geq 0$

$C = 2\,n_1\,n_2\,n_3, \quad P = n_1\,n_2^2 + 2\,n_1\,n_3\,n_2 + n_1\,n_3^2,$
$R = n_1\left(n_2^2 - n_3^2\right), \quad n_1 \in \mathbb{Z}, \quad n_2 \in \mathbb{Z}, \quad n_3 \in \mathbb{Z}, \quad n_3 \geq 0$

$\mathbb{Z}$ is the set of integers

Polynomial discriminant

$\Delta_P = 4\,C^2 - 4\,R^2$

Property as a function

Parity

even

Derivative

$\frac{\partial}{\partial C}\left(P^2 - 2\,P\,C + R^2\right) = -2\,P$

Indefinite integral

$\int \left(P^2 - 2\,P\,C + R^2\right) dC = C^2\,(-P) + C\,P^2 + C\,R^2 + \text{constant}$

Global minimum

$\min\{P^2 - 2PC + R^2\} = P(P - 2C)$ at $R = 0$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L}\left(-2CP + P^2 + R^2\right) dR\, dP\, dC = \frac{16L^5}{3}$$

From the indefinite integral result

$$\int \left(P^2 - 2PC + R^2\right) dC = C^2(-P) + CP^2 + CR^2 + \text{constant}$$

we obtain:

-C^2 P + C P^2 + C R^2

Input

$-C^2 P + C P^2 + C R^2$

Geometric figure

line

Alternate forms

$C\left(-CP + P^2 + R^2\right)$

$C\left(P^2 - CP\right) + CR^2$

$C\left(P^2 + R^2\right) - C^2 P$

Real root

$C = 0$

Roots

$R = \sqrt{P}\ \left(-\sqrt{C - P}\right)$

$R = \sqrt{P}\ \sqrt{C - P}$

Polynomial discriminant

$\Delta_C = \left(P^2 + R^2\right)^2$

Property as a function

Parity

even

Derivative

$$\frac{\partial}{\partial C}\left(-C^2\,P + C\,P^2 + C\,R^2\right) = -2\,C\,P + P^2 + R^2$$

Indefinite integral

$$\int \left(-C^2\,P + C\,P^2 + C\,R^2\right) dC = \frac{1}{2}\,C^2\left(P^2 + R^2\right) - \frac{C^3\,P}{3} + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L}\left(-C^2\,P + C\,P^2 + C\,R^2\right) dR\,dP\,dC = 0$$

Again, from the indefinite integral result

$$\int \left(-C^2 P + C P^2 + C R^2\right) dC = \frac{1}{2} C^2 \left(P^2 + R^2\right) - \frac{C^3 P}{3} + \text{constant}$$

we obtain:

-(C^3 P)/3 + 1/2 C^2 (P^2 + R^2)

Input

$$-\frac{1}{3}\left(C^3 P\right) + \frac{1}{2} C^2 \left(P^2 + R^2\right)$$

Result

$$\frac{1}{2} C^2 \left(P^2 + R^2\right) - \frac{C^3 P}{3}$$

Geometric figure

line

Alternate forms

$$\frac{1}{6} C^2 \left(-2 C P + 3 P^2 + 3 R^2\right)$$

$$\frac{1}{6} C^2 \left(3\left(P^2 + R^2\right) - 2 C P\right)$$

$$-\frac{1}{6} C^2 \left(2 C P - 3\left(P^2 + R^2\right)\right)$$

Expanded form

$$-\frac{C^3 P}{3}+\frac{C^2 P^2}{2}+\frac{C^2 R^2}{2}$$

Real root

$C = 0$

Roots

$$R = -\frac{\sqrt{P}\ \sqrt{2C-3P}}{\sqrt{3}}$$

$$R = \frac{\sqrt{P}\ \sqrt{2C-3P}}{\sqrt{3}}$$

Polynomial discriminant

$\Delta = 0$

Property as a function

Parity

even

Derivative

$$\frac{\partial}{\partial C}\left(-\frac{1}{3}\left(C^3 P\right)+\frac{1}{2}C^2\left(P^2+R^2\right)\right) = C\left(\left(P^2+R^2\right)-C P\right)$$

Indefinite integral

$$\int\left(-\frac{C^3 P}{3}+\frac{1}{2}C^2\left(P^2+R^2\right)\right)dC = \frac{1}{6}\left(C^3\left(P^2+R^2\right)-\frac{C^4 P}{2}\right) + \text{constant}$$

Global minimum

$$\min\left\{-\frac{1}{3}\left(C^3\,P\right)+\frac{1}{2}C^2\left(P^2+R^2\right)\right\}=\frac{1}{6}C^2\,P\,(3\,P-2\,C)\ \text{at}\ R=0$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L}\left(-\frac{C^3\,P}{3}+\frac{1}{2}C^2\left(P^2+R^2\right)\right)dR\,dP\,dC=\frac{8\,L^7}{9}$$

From the indefinite integral result

$$\int\left(-\frac{C^3\,P}{3}+\frac{1}{2}C^2\left(P^2+R^2\right)\right)dC=\frac{1}{6}\left(C^3\left(P^2+R^2\right)-\frac{C^4\,P}{2}\right)+\text{constant}$$

we obtain:

1/6 (-(C^4 P)/2 + C^3 (P^2 + R^2))

Input

$$\frac{1}{6}\left(-\frac{1}{2}\left(C^4\,P\right)+C^3\left(P^2+R^2\right)\right)$$

Result

$$\frac{1}{6}\left(C^3\left(P^2+R^2\right)-\frac{C^4\,P}{2}\right)$$

Geometric figure

line

Alternate forms

$$\frac{1}{12} C^3 \left(-C P + 2 P^2 + 2 R^2\right)$$

$$\frac{1}{12} C^3 \left(2 \left(P^2 + R^2\right) - C P\right)$$

$$-\frac{1}{12} C^3 \left(C P - 2 \left(P^2 + R^2\right)\right)$$

Expanded form

$$-\frac{C^4 P}{12} + \frac{C^3 P^2}{6} + \frac{C^3 R^2}{6}$$

Alternate form assuming C, P, and R are positive

$$\frac{1}{6} C^3 \left(P^2 + R^2\right) - \frac{C^4 P}{12}$$

Real root

$$C = 0$$

Roots

$$R = -\frac{\sqrt{P}\ \sqrt{C - 2 P}}{\sqrt{2}}$$

$$R = \frac{\sqrt{P}\ \sqrt{C - 2 P}}{\sqrt{2}}$$

Polynomial discriminant

$\Delta = 0$

Property as a function

Parity

even

Derivative

$$\frac{\partial}{\partial C}\left(\frac{1}{6}\left(-\frac{1}{2}\left(C^4\,P\right)+C^3\left(P^2+R^2\right)\right)\right)=\frac{1}{6}\,C^2\left(3\left(P^2+R^2\right)-2\,C\,P\right)$$

Indefinite integral

$$\int\frac{1}{6}\left(-\frac{C^4\,P}{2}+C^3\left(P^2+R^2\right)\right)dC=\frac{1}{12}\left(\frac{1}{2}\,C^4\left(P^2+R^2\right)-\frac{C^5\,P}{5}\right)+\text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L}\frac{1}{6}\left(-\frac{C^4\,P}{2}+C^3\left(P^2+R^2\right)\right)dR\,dP\,dC=0$$

From the indefinite integral result

$$\int\frac{1}{6}\left(-\frac{C^4\,P}{2}+C^3\left(P^2+R^2\right)\right)dC=\frac{1}{12}\left(\frac{1}{2}\,C^4\left(P^2+R^2\right)-\frac{C^5\,P}{5}\right)+\text{constant}$$

1/12 (-(C^5 P)/5 + 1/2 C^4 (P^2 + R^2))

for C = 2, P = 4 and R = 8:

1/12 (-(2^5*4)/5 + 1/2 2^4 (4^2 + 8^2))

Input

$$\frac{1}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)$$

Exact result

$$\frac{256}{5}$$

Decimal form

51.2

51.2

From which:

2Pi*5(1/12 (-(2^5*4)/5 + 1/2 2^4 (4^2 + 8^2)))+123-5/2

Input

$$2\pi\times 5\left(\frac{1}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\right)+123-\frac{5}{2}$$

Result

$$\frac{241}{2}+512\,\pi$$

Decimal approximation

1728.995438637974138092873412239105476708950732480054180339171631 2

…

1728.9954386379….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Property

$\frac{241}{2} + 512\,\pi$ is a transcendental number

Alternate form

$\frac{1}{2}(241 + 1024\,\pi)$

Alternative representations

$$\frac{2}{12}\left(-\frac{1}{5}\left(2^5 \times 4\right) + \frac{1}{2} \times 2^4\left(4^2 + 8^2\right)\right)\pi\,5 + 123 - \frac{5}{2} = \frac{241}{2} + \frac{1800}{12} \circ \left(-\frac{4 \times 2^5}{5} + \frac{1}{2} \times 2^4\left(4^2 + 8^2\right)\right)$$

$$\frac{2}{12}\left(-\frac{1}{5}\left(2^5 \times 4\right) + \frac{1}{2} \times 2^4\left(4^2 + 8^2\right)\right)\pi\,5 + 123 - \frac{5}{2} = \frac{241}{2} - \frac{10}{12}\,i\log(-1)\left(-\frac{4 \times 2^5}{5} + \frac{1}{2} \times 2^4\left(4^2 + 8^2\right)\right)$$

$$\frac{2}{12}\left(-\frac{1}{5}\left(2^5 \times 4\right) + \frac{1}{2} \times 2^4\left(4^2 + 8^2\right)\right)\pi\,5 + 123 - \frac{5}{2} = \frac{241}{2} + \frac{10}{12}\cos^{-1}(-1)\left(-\frac{4 \times 2^5}{5} + \frac{1}{2} \times 2^4\left(4^2 + 8^2\right)\right)$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi 5+123-\frac{5}{2}=\frac{241}{2}+2048\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi 5+123-\frac{5}{2}=\frac{241}{2}+\sum_{k=0}^{\infty}-\frac{2048\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi 5+123-\frac{5}{2}=\frac{241}{2}+512\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi 5+123-\frac{5}{2}=\frac{241}{2}+2048\int_0^1\sqrt{1-t^2}\,dt$$

$$\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi 5+123-\frac{5}{2}=\frac{241}{2}+1024\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt$$

$$\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi 5+123-\frac{5}{2}=\frac{241}{2}+1024\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

(1/27((2Pi*5(1/12 (-(2^5*4)/5 + 1/2 2^4 (4^2 + 8^2)))+123-5/2)-1))^2

Input

$$\left(\frac{1}{27}\left(\left(2\pi\times 5\left(\frac{1}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\right)+123-\frac{5}{2}\right)-1\right)\right)^2$$

Result

$$\frac{1}{729}\left(\frac{239}{2}+512\,\pi\right)^2$$

Decimal approximation

4095.97837579375122740733272180614536645968949584974316470721958 67

…

4095.9783757937…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero.

Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Property

$\frac{1}{729}\left(\frac{239}{2}+512\,\pi\right)^2$ is a transcendental number

Expanded form

$$\frac{57\,121}{2916}+\frac{122\,368\,\pi}{729}+\frac{262\,144\,\pi^2}{729}$$

Alternate form

$$\frac{(239+1024\,\pi)^2}{2916}$$

Alternative representations

$$\left(\frac{1}{27}\left(\left(\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi\,5+123-\frac{5}{2}\right)-1\right)\right)^2=\left(\frac{1}{27}\left(\frac{239}{2}+\frac{1800}{12}\circ\left(-\frac{4\times 2^5}{5}+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi\,5+123-\frac{5}{2}\right)-1\right)\right)^2=\left(\frac{1}{27}\left(\frac{239}{2}-\frac{10}{12}\,i\log(-1)\left(-\frac{4\times 2^5}{5}+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi 5+123-\frac{5}{2}\right)-1\right)\right)^2 = \left(\frac{1}{27}\left(\frac{239}{2}+\frac{10}{12}\cos^{-1}(-1)\left(-\frac{4\times 2^5}{5}+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\right)\right)^2$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\left(\frac{1}{27}\left(\left(\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi 5+123-\frac{5}{2}\right)-1\right)\right)^2 = \frac{\left(239+4096\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^2}{2916}$$

$$\left(\frac{1}{27}\left(\left(\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi 5+123-\frac{5}{2}\right)-1\right)\right)^2 = \frac{\left(239+\sum_{k=0}^{\infty}-\frac{4096(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}\right)^2}{2916}$$

$$\left(\frac{1}{27}\left(\left(\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi 5+123-\frac{5}{2}\right)-1\right)\right)^2 = \frac{\left(239+1024\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)\right)^2}{2916}$$

Integral representations

$$\left(\frac{1}{27}\left(\left(\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi 5+123-\frac{5}{2}\right)-1\right)\right)^2 = \frac{\left(239+4096\int_0^1\sqrt{1-t^2}\,dt\right)^2}{2916}$$

$$\left(\frac{1}{27}\left(\left(\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi\, 5+123-\frac{5}{2}\right)-1\right)\right)^2=\frac{\left(239+2048\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2}{2916}$$

$$\left(\frac{1}{27}\left(\left(\frac{2}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\pi\, 5+123-\frac{5}{2}\right)-1\right)\right)^2=\frac{\left(239+2048\int_0^{1}\frac{1}{\sqrt{1-t^2}}\,dt\right)^2}{2916}$$

(2Pi*5(1/12 (-(2^5*4)/5 + 1/2 2^4 (4^2 + 8^2)))+123-5/2)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{2\pi\times 5\left(\frac{1}{12}\left(-\frac{1}{5}\left(2^5\times 4\right)+\frac{1}{2}\times 2^4\left(4^2+8^2\right)\right)\right)+123-\frac{5}{2}}+{C_{\text{MRB}}}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Exact result

$${C_{\text{MRB}}}^{1-1/(4\pi)+\pi}+\sqrt[15]{\frac{241}{2}+512\,\pi}$$

Decimal approximation

1.644937735021118439067315607072718209713235433432144629978323001 0…

1.644937735…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi} + \sqrt[15]{\frac{1}{2}(241 + 1024\,\pi)}$$

$$\frac{\sqrt[15]{2}\; C_{\text{MRB}}^{\,1-1/(4\pi)+\pi} + \sqrt[15]{241 + 1024\,\pi}}{\sqrt[15]{2}}$$

$$\frac{1}{2} C_{\text{MRB}}^{\,-1/(4\pi)} \left(2\, C_{\text{MRB}}^{\,1+\pi} + 2^{14/15}\, \sqrt[15]{241 + 1024\,\pi}\; \sqrt[4\pi]{C_{\text{MRB}}}\right)$$

From

“**Formole per l’eclisse solare del 30 Agosto 1905** – Nota del *Prof. Giulio Grablovitz*

We have that:

Essendo L la latitudine geografica Nord e l la longitudine in gradi Est Greenwich di un punto pel quale si richiedono le dette circostanze, pongasi:

$$L - 42^0 = m,$$
$$l - 12^0\ 30' = n.$$

Sia P l’ istante del primo contatto in t. m. civile MEC;
F „ della fine idem;
H „ „ massima fase idem;
M millesimi di diametro solare occultati nella fase massima;
W l’angolo contato dal Nord verso Ovest all’ ingresso;
E „ „ „ „ Est all’ egresso;

i rispettivi valori riescono espressi dalle seguenti formole:

$$P = 13^h\ 16^m\ 53^s\ 2 - 64^s\ 625\ m + 1^s\ 573\ m^2 + 107^s\ 700\ n - 0^s\ 433\ n^2 - 0^s\ 975\ mn$$
$$F = 15\ 44\ 17^s\ 2 - 118\ 750\ m + 0\ 894\ m^2 + 44\ 200\ n - 0\ 948\ n^2 - 0\ 612\ mn$$
$$H = 14\ 33\ 46^s\ 2 - 98\ 875\ m + 0\ 842\ m^2 + 77\ 100\ n - 0\ 833\ n^2 - 0\ 925\ mn$$
$$M = 852^s\ 0 - 19^s\ 708\ m + 0^s\ 094\ m^2 - 10^s\ 433n$$
$$W = 75^0\ 0 + 1^0\ 288\ m + 0^0\ 633n$$
$$E = 124^0\ 0 + 1^0\ 008\ m + 0^0\ 473\ n$$

23.08.1905 Luna ultimo quarto 2° 22’

30.08.1905 Luna nuova 13:13 6° 28’

23.08.1905 alta marea Ischia 7h 15m – 19h 35m

25.08.1905 alta marea Ischia 8h 30m – 20h 45m

25.08.1905 Terremoto Valle Peligna 20h 41m

Data	1905-08-25 20:41	
	Lat, Lon	42.019, 14.026
	MDP set	► 29 MDPs Imax 7 MCS Arch. Mac. GNDT, 1995
	Io	6
	Mw	5.15 ± 0.20

Sulmona-Valle Peligna

08.09.1905 Terremoto Calabria Centrale 01:43

Data	1905-09-08 01:43	
	Lat, Lon	38.811, 16.000
	MDP set	► 895 MDPs Imax 10-11 MCS Galli and Molin, 2007
	Io	10-11
	Mw	6.95 ± 0.09

Calabria Centrale

30.08.1905 Luna nuova (eclisse solare) 13:13 6° 28’

06.09.1905 Luna primo quarto 17° 24’

08.09.1905 Alta marea Ischia 7h 35m – 20h 00m

(7h 35m)

Input interpretation

7 hours 35 minutes

Results

7.583 hours

455 minutes

Unit conversions

27300 seconds

27300 seconds = 7.583°

(20h 00m)

Input interpretation

20 hours

Results

20 hours

1200 minutes

Unit conversions

72000 seconds

72000 seconds = 20°

08.09.1905 basse maree Venezia 15h 50m - 3h 30m

(15h 50m)

Input interpretation

15 hours 50 minutes

Results

15.83 hours

950 minutes

Unit conversions

57 000 seconds

57000 seconds = 15.83°

(3h 30m)

Input interpretation

3 hours 30 minutes

Results

3.5 hours

210 minutes

Unit conversions

12 600 seconds

12600 seconds = 3.5°

27300 seconds = 7.583°

72000 seconds = 20°

57000 seconds = 15.83°

12600 seconds = 3.5°

(20° + 15.83° + 3.5°)

Input interpretation

20° (degrees) + 15.83° (degrees) + 3.5° (degrees)

Result

39.33° (degrees)

39.33°

Unit conversions

686.4 mrad (milliradians)

0.6864 radians

---

39 degrees 19 arcminutes 50 arcseconds

(20° + 7.583° + 3.5° - 15.83°)

Input interpretation

20° (degrees) + 7.583° (degrees) + 3.5° (degrees) – 15.83° (degrees)

Result

15.25° (degrees)

15.25°

Unit conversions

266.2 mrad (milliradians)

0.2662 radians

---

15 degrees 15 arcminutes 11 arcseconds

39° 19’ N 15° 15’ E (Mare Tirreno – di fronte costa Calabra (Cosenza))

30.08.1905 +54 years 34 days 2 hours 6 minutes

Input interpretation

Wednesday, August 30, 1905 + 54 years 34 days 2 hours 6 minutes

Result

2:06 am CET | Saturday, October 3, 1959

3.10.1959

2:06 am Saturday, October 3, 1959 +36 years 22 days 17 hours 24 minutes

Input interpretation

2:06 am CET | Saturday, October 3, 1959 +
36 years 22 days 17 hours 24 minutes

Result

7:30 pm CET | Wednesday, October 25, 1995

25.10.1995

The solar eclipse of October 24, 1995 is an astronomical event that took place on the aforementioned day at around 4.33 UTC. The total eclipse was visible in some parts of Asia (India, Indonesia, Iran and Thailand) and Oceania (Australia)

10.24.1995 New moon 04:36

Data	1995-10-29 08:40:28.48			
	Lat, Lon			35.580, 11.632
	depth			5 km
	Mw			4.76 ± 0.14

Strait of Sicily

Data	1995-10-29 13:00:27.69			
	Lat, Lon	45.723, 9.849		
	MDP set	► 408 MDPs	Imax 5-6 MCS	Bollettino Macrosismico ING, 1999d
	Io	5-6		
	depth	32.5 km		
	Mw	4.35 ± 0.08		

Iseo Lake

Oct 25, 1995 7:30 pm + 354 days 8 hours 48 minutes 36 seconds

Input interpretation

7:30 pm CET | Wednesday, October 25, 1995 +
354 days 8 hours 48 minutes 36 seconds

Result

4:18:36 am CEST | Monday, October 14, 1996

14.10.1996

Data	1996-10-15 09:55:59.95	
	Lat, Lon	44.798, 10.678
	MDP set	▶ 135 MDPs Imax 7 MCS Camassi et al., 1996
	Io	7
	depth	1.3 km
	Mw	5.38 ± 0.10

Emilian plain

12.10.1996 New Moon – Solar Eclipse 14h 14m

12.10 high tide Ischia 10.45 = 10.75° = 10° 45'

15.10 high tide Ischia 13.20 = 13.33° = 13° 19'

(3+Pi/10)(13° 19')

Input interpretation

$\left(3 + \frac{\pi}{10}\right)$ (13 degrees 19 arcminutes)

Results

44 degrees 8.013 arcminutes

44° 8' N 13° 19' E = (Mediterranean Sea – off Rimini – Ancona)

Data	1996-12-02 13:01:40		
	Lat, Lon	37.685, 15.161	
	MDP set	▶ 42 MDPs	Imax 6 EMS-98 Azzaro et al., 2000
	Io	6	
	Mw	3.50 ± 0.33	

Etna

3.12.1996 Last Quarter Moon 14° 44'

29.11 13h 20m high tide Ischia 13.33°

(2+(2√2)/Pi)*13.33°

Input interpretation

$$\left(2+\frac{2\sqrt{2}}{\pi}\right)\times 13.33^\circ \text{ (degrees)}$$

Result

38.66° (degrees)

38.66°

Unit conversions

674.8 mrad (milliradians)

0.6748 radians

38 degrees 39 arcminutes 40.38 arcseconds

38° 39' N 13° 33' E (Tyrrhenian Sea - off the coast of Northern Sicily)

From the analysis of these seismic events, Prof. Giulio Grablovitz's hypothesis can also be supported:

> **"La marea adriatica si forma alla latitudine di 38° a 39°, in causa delle oscillazioni impresse al suolo dall' attrazione luni-solare presso all' imbocco del mare Adriatico.„**
>
> **Questa parte flessibile della crosta terrestre che, secondo tutte le apparenze, ha sede negli arcipelaghi d' indole vulcanica della Sicilia e della Grecia, ha per centro assai probabilmente il monte Etna.**

Now, we analyze the following formula:

$$D = 223^{s}\,4\sqrt{1-\left(\frac{24{\cdot}5-E}{24{\cdot}5}\right)^{2}}$$

We consider:

223.4*sqrt(1-((24.5 – (M-1000))/(24.5))^2)

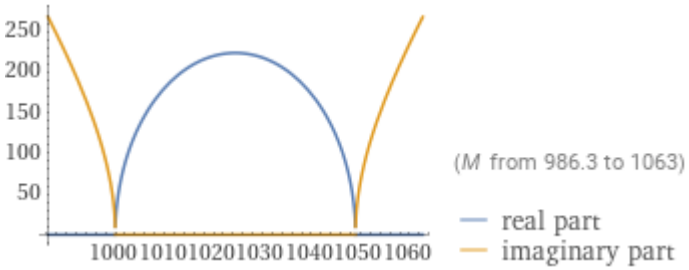
Input

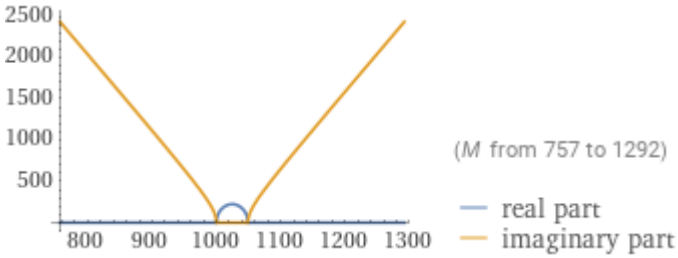
$$223.4\sqrt{1-\left(\frac{24.5-(M-1000)}{24.5}\right)^{2}}$$

Result

$$223.4\sqrt{1-0.00166597\,(1024.5-M)^2}$$

Plots (figures that can be related to the open strings)





Alternate forms

$$223.4\sqrt{M\,(3.41358-0.00166597\,M)-1747.61}$$

$$223.4\sqrt{-0.00166597\,M^2+3.41358\,M-1747.61}$$

Roots

$$M=1000$$

$$M=1049$$

Series expansion at M=1000.

$$\begin{cases} -0.000106525\,i + \left(1.91226\times 10^{7}\,i\right)(M-1000.) + \left(1.71637\times 10^{18}\,i\right)(M-1000.)^2 + \left(3.08109\times 10^{29}\,i\right)(M-1000.)^3 + \left(6.91366\times 10^{40}\,i\right)(M-1000.)^4 + \left(1.73752\times 10^{52}\,i\right)(M-1000.)^5 + O\left((M-1000.)^6\right) & 49.\,\mathrm{Im}(M) < \mathrm{Im}\left((M-1000.)^2\right) \\ 0.000106525\,i - \left(1.91226\times 10^{7}\,i\right)(M-1000.) - \left(1.71637\times 10^{18}\,i\right)(M-1000.)^2 - \left(3.08109\times 10^{29}\,i\right)(M-1000.)^3 - \left(6.91366\times 10^{40}\,i\right)(M-1000.)^4 - \left(1.73752\times 10^{52}\,i\right)(M-1000.)^5 + O\left((M-1000.)^6\right) & \text{(otherwise)} \end{cases}$$

Series expansion at M=1049.

$$\frac{63.8286\sqrt{M-1049.}\,\sqrt{1049.-M}}{\sqrt{M-1049.}} + \frac{0.651312\,(M-1049.)^{3/2}\sqrt{1049.-M}}{\sqrt{M-1049.}} - \frac{0.00332302\,(M-1049.)^{5/2}\sqrt{1049.-M}}{\sqrt{M-1049.}} + O\left((M-1049.)^{7/2}\right)$$

(generalized Puiseux series)

Series expansion at M=∞

$$-\frac{9.11837\,M\,M}{\sqrt{-M^2}} + \frac{9341.77\,M}{\sqrt{-M^2}} + \frac{2736.65\,M}{\sqrt{-M^2}\;M} + \frac{2.8037\times 10^{6}\,M}{\sqrt{-M^2}\;M^2} + O\left(\left(\frac{1}{M}\right)^3\right)$$

(generalized Puiseux series)

Derivative

$$\frac{d}{dM}\left(223.4\sqrt{1-\left(\frac{24.5-(M-1000)}{24.5}\right)^2}\right) = \frac{381.297-0.372178\,M}{\sqrt{-0.00166597\,M^2+3.41358\,M-1747.61}}$$

Indefinite integral

$$\int 223.4\sqrt{1-0.00166597\,(1024.5-M)^2}\;dM =$$

$$111.7\,(M-1024.5)\sqrt{-0.00166597\,M^2+3.41358\,M-1747.61}\;-2736.65\sin^{-1}(41.8163-0.0408163\,M)+\text{constant}$$

$\sin^{-1}(x)$ is the inverse sine function

Global maximum

$$\max\left\{223.4\sqrt{1-\left(\frac{24.5-(M-1000)}{24.5}\right)^2}\right\}=\frac{1117}{5}\;\text{at}\;M=\frac{2049}{2}$$

Global minima

$$\min\left\{223.4\sqrt{1-\left(\frac{24.5-(M-1000)}{24.5}\right)^2}\right\}=0\;\text{at}\;M=\frac{2049}{2}-\frac{\sqrt{\frac{1\,133\,370\,857\,318\,394}{75\,526\,587\,743}}}{5}$$

$$\min\left\{223.4\sqrt{1-\left(\frac{24.5-(M-1000)}{24.5}\right)^2}\right\}=0\;\text{at}\;M=\frac{2049}{2}+\frac{\sqrt{\frac{1\,133\,370\,857\,318\,394}{75\,526\,587\,743}}}{5}$$

We analyze the following formula

$$P = 13^h\,16^m\,53^s\,2 - 64^s\,625\,m + 1^s\,573\,m^2 + 107^s\,700\,n - 0^s\,433\,n^2 - 0^s\,975\,mn$$
$$F = 15\;\;44\;\;17'\;\;2 - 118\;\;750\,m + 0\;\;894\,m^2 + \;\;44\;\;200\,n - 0\;\;948\,n^2 - 0\;\;612\,mn$$
$$H = 14\;\;33\;\;46'\;\;2 - \;\;98\;\;875\,m + 0\;\;842\,m^2 + \;\;77\;\;100\,n - 0\;\;833\,n^2 - 0\;\;925\,mn$$
$$M = 852'\cdot 0 - 19'\cdot 708\,m + 0'\cdot 094\,m^2 - 10'\cdot 433n$$
$$W = \;\;75^0\,0 + 1^0\,288\,m + 0^0\,633n$$
$$E = 124^0\,0 + 1^0\,008\,m + 0^0\,473\,n$$

we consider:

(47813seconds – 64.625seconds*(-3790.8seconds) + 1.573seconds*(-3790.8seconds)^2+107.700seconds*(4017.6seconds) – 0.433seconds*(4017.6seconds)^2-0.975seconds*(-3790.8seconds)*(4017.6seconds))

thus:

(47813 – 64.625*(-3790.8) + 1.573*(-3790.8)^2+107.700*(4017.6) – 0.433*(4017.6)^2-0.975*(-3790.8)*(4017.6))

Input interpretation

$$47\,813 - 3790.8 \times (-64.625) + 1.573\,(-3790.8)^2 + 107.700 \times 4017.6 - 0.433 \times 4017.6^2 + 0.975 \times (-3790.8) \times (-4017.6)$$

Result

$3.118982755064 \times 10^7$

31189827.55064 seconds

Input interpretation

$3.118982755064 \times 10^7$ seconds

Unit conversions

360 days 23 hours 50 minutes 27.5506 seconds

---

519 830.459177 minutes

8663.84098629 hours

360.993374429 days

51.5704820612 weeks

31189827.55064 seconds = 9626.489984765°

168.0139456444 radians

From which, we obtain:

12((168.0139456444)-24)+√3/2

Input interpretation

$$12\,(168.0139456444 - 24) + \frac{\sqrt{3}}{2}$$

Result

1729.033373137…

1729.033373137…

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons.

This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(1/27((12((168.0139456444)-24)+√3/2)-1))^2-4/5*MRB const

Input interpretation

$$\left(\frac{1}{27}\left(\left(12\,(168.0139456444-24)+\frac{\sqrt{3}}{2}\right)-1\right)\right)^2-\frac{4}{5}\,C_{\text{MRB}}$$

C_{MRB} is the MRB constant

Result

4096.007927202…

4096.007927202…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192).

This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

((12((168.0139456444)-24)+√3/2))^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\sqrt[15]{12\,(168.0139456444 - 24) + \frac{\sqrt{3}}{2}} + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.6449401393713…

1.6449401393713…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

From

Eclisse Solare del 21 Agosto 1914 – Nota del *Prof. Giulio Grablovitz*

We analyze the following equation:

$$s = \sqrt{1 - \left(\frac{K}{85}\right)^2}\ S.$$

We consider:

sqrt(1-(K/85)^2)*S

Input

$$\sqrt{1 - \left(\frac{K}{85}\right)^2}\ S$$

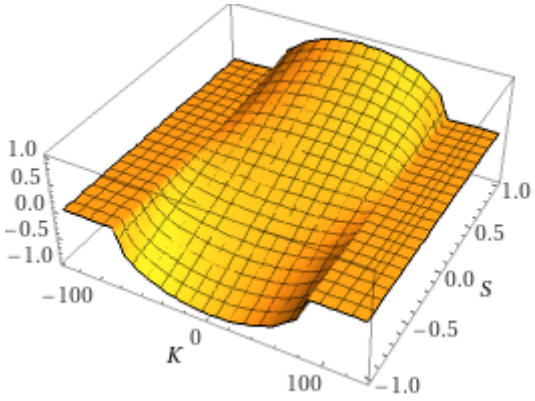
Result

$$\sqrt{1 - \frac{K^2}{7225}}\ S$$

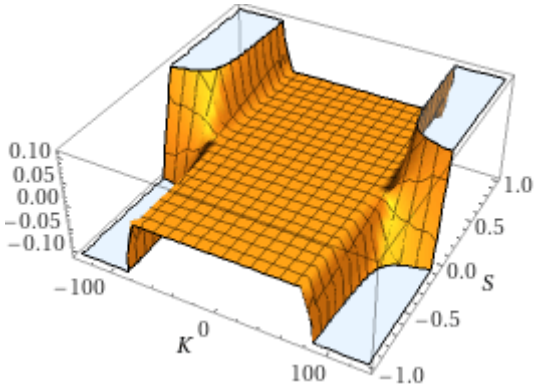
3D plots

Real part **(figures that can be related to the D-branes/Instantons)**

The key observation from the below plots and is that at $S = 1$, which is taken as the energy density of the universe at the Big Bang, with $K = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.

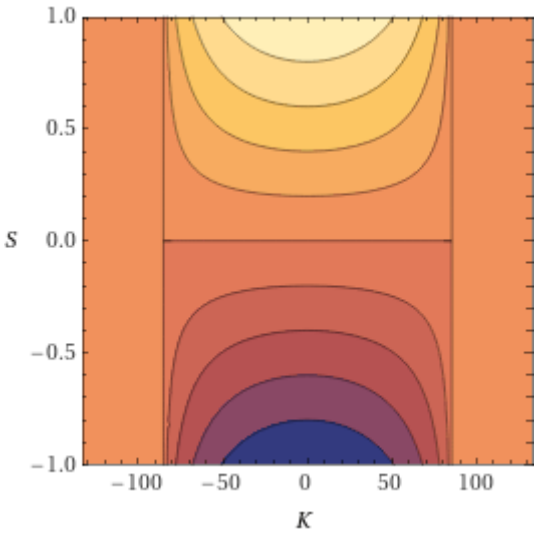


Imaginary part

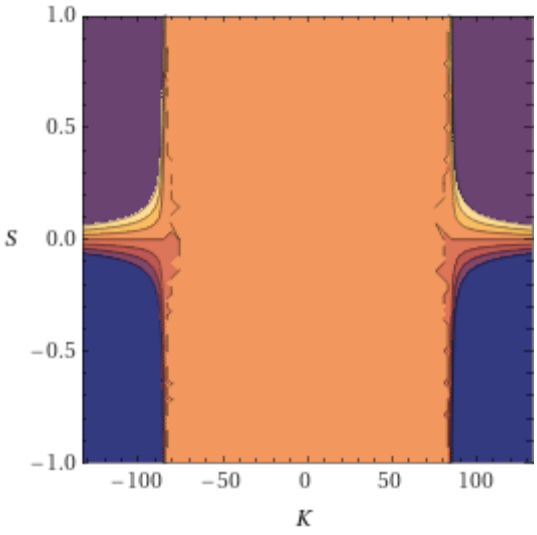


Contour plots

Real part



Imaginary part



Alternate forms

$$\frac{1}{85}\sqrt{7225-K^2}\;S$$

$$\frac{1}{85}\sqrt{85-K}\;\sqrt{K+85}\;S$$

Root

$K^2 - 7225 \neq 0\,, \quad S = 0$

Roots

$K = -85$

$K = 85$

Integer roots

$K = \pm 84\,, \quad S = 0$

$K = \pm 83\,, \quad S = 0$

$K = \pm 82\,, \quad S = 0$

$K = \pm 81\,, \quad S = 0$

$K = \pm 80\,, \quad S = 0$

Number of integer solutions

171

Property as a function

Parity

odd

Series expansion at K=0

$$S - \frac{K^2 S}{14450} - \frac{K^4 S}{417605000} + O(K^5)$$

(Taylor series)

Series expansion at K=∞

$$-\frac{K(KS)}{85\sqrt{-K^2}} + \frac{85KS}{2\sqrt{-K^2}\,K} + \frac{614125KS}{8\sqrt{-K^2}\,K^3} + \frac{4437053125KS}{16\sqrt{-K^2}\,K^5} + O\left(\left(\frac{1}{K}\right)^9\right)$$

(generalized Puiseux series)

Derivative

$$\frac{\partial}{\partial K}\left(\sqrt{1-\left(\frac{K}{85}\right)^2}\,S\right) = -\frac{KS}{85\sqrt{7225-K^2}}$$

Indefinite integral

$$\int \sqrt{1-\frac{K^2}{7225}}\,S\,dK = \frac{1}{170}S\left(\sqrt{7225-K^2}\,K + 7225\sin^{-1}\left(\frac{K}{85}\right)\right) + \text{constant}$$

Series representations

$$\sqrt{1-\left(\frac{K}{85}\right)^2}\,S = S\sqrt{-\frac{K^2}{7225}}\sum_{k=0}^{\infty} 7225^k\left(-K^2\right)^{-k}\binom{\frac{1}{2}}{k} \quad \text{for } |K| > 85$$

$$\sqrt{1-\left(\frac{K}{85}\right)^2}\,S = S\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{7225}\right)^k\left(-K^2\right)^k\left(-\frac{1}{2}\right)_k}{k!} \quad \text{for } |K|^2 < 7225$$

$$\sqrt{1-\left(\frac{K}{85}\right)^2}\ S = S\sqrt{-\frac{K^2}{7225}}\ \sum_{k=0}^{\infty}\frac{(-7225)^k\left(-K^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\quad \text{for } |K| > 85$$

Definite integral over a square of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\sqrt{1-\frac{K^2}{7225}}\ S\,dS\,dK = 0$$

From the indefinite integral result

$$\int\sqrt{1-\frac{K^2}{7225}}\ S\,dK = \frac{1}{170}\,S\left(\sqrt{7225-K^2}\ K + 7225\sin^{-1}\left(\frac{K}{85}\right)\right) + \text{constant}$$

we obtain:

1/170 S (K sqrt(7225 - K^2) + 7225 sin^(-1)(K/85))

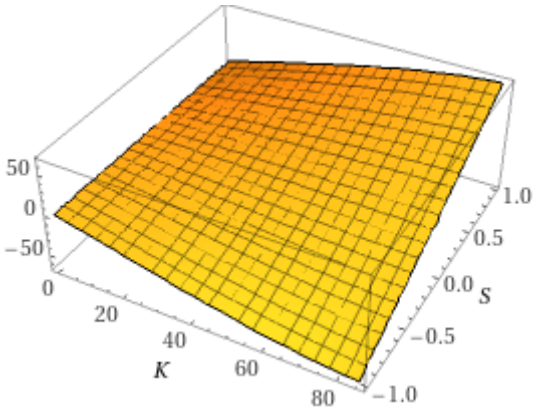
Input

$$\frac{1}{170}\,S\left(K\sqrt{7225-K^2} + 7225\sin^{-1}\left(\frac{K}{85}\right)\right)$$

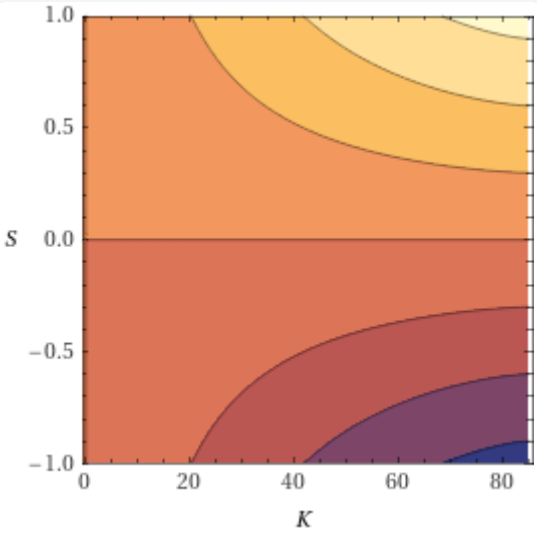
$\sin^{-1}(x)$ is the inverse sine function

3D plot **(figure that can be related to a D-brane/Instanton)**

The key observation from the below plots and is that at $K = 1$, which is taken as the energy density of the universe at the Big Bang, with $S = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.



Contour plot



Alternate forms

$$S\left(\frac{1}{170}\sqrt{7225-K^2}\;K+\frac{85}{2}\sin^{-1}\left(\frac{K}{85}\right)\right)$$

$$\frac{1}{170} S\left(\sqrt{85-K}\ \sqrt{K+85}\ K+7225 \sin^{-1}\left(\frac{K}{85}\right)\right)$$

$$\frac{1}{170} K \sqrt{7225-K^2}\ S-\frac{85}{2} i S \log\left(\sqrt{1-\frac{K^2}{7225}}+\frac{i K}{85}\right)$$

log(x) is the natural logarithm

Expanded form

$$\frac{1}{170} K \sqrt{7225-K^2}\ S+\frac{85}{2} S \sin^{-1}\left(\frac{K}{85}\right)$$

Real roots

$-85 \leq K < 0, \quad S = 0$

$K = 0$

$0 < K \leq 85, \quad S = 0$

Integer roots

$K = \pm 85, \quad S = 0$

$K = \pm 84, \quad S = 0$

$K = \pm 83, \quad S = 0$

$K = \pm 82, \quad S = 0$

$K = \pm 81, \quad S = 0$

Property as a function

Parity

even

Root for the variable S

$S = 0$

Series expansion at K=0

$$K S - \frac{K^3 S}{43\,350} - \frac{K^5 S}{2\,088\,025\,000} - \frac{K^7 S}{42\,240\,745\,750\,000} + O\left(K^9\right)$$

(Taylor series)

Series expansion at K=∞

$$-\frac{K^2 (K S)}{170\sqrt{-K^2}} - \frac{85\left(S\left(\sqrt{-K^2} + 2\,i\,K\log(K) - K\left(\pi + i\log\left(\frac{7225}{4}\right)\right)\right)\right)}{4\,K} - \frac{614\,125\left(\left(\sqrt{-K^2} - 2\,i\,K\right)S\right)}{16\,K\,K^2} + O\left(\left(\frac{1}{K}\right)^4\right)$$

(generalized Puiseux series)

Derivative

$$\frac{\partial}{\partial K}\left(\frac{1}{170}S\left(K\sqrt{7225 - K^2} + 7225\sin^{-1}\left(\frac{K}{85}\right)\right)\right) = \frac{1}{85}\sqrt{7225 - K^2}\,S$$

Indefinite integral

$$\int \frac{1}{170} S\left(K\sqrt{7225-K^2}+7225\sin^{-1}\left(\frac{K}{85}\right)\right)dK =$$
$$\frac{1}{510}\sqrt{7225-K^2}\left(K^2+14450\right)S+\frac{85}{2}KS\sin^{-1}\left(\frac{K}{85}\right)+\text{constant}$$

Alternative representations

$$\frac{1}{170} S\left(K\sqrt{7225-K^2}+7225\sin^{-1}\left(\frac{K}{85}\right)\right)=$$
$$\frac{1}{170} S\left(7225\,\text{sd}^{-1}\left(\frac{K}{85}\,\middle|\,0\right)+K\sqrt{7225-K^2}\right)$$

$$\frac{1}{170} S\left(K\sqrt{7225-K^2}+7225\sin^{-1}\left(\frac{K}{85}\right)\right)=$$
$$\frac{1}{170} S\left(7225\,\text{sn}^{-1}\left(\frac{K}{85}\,\middle|\,0\right)+K\sqrt{7225-K^2}\right)$$

$$\frac{1}{170} S\left(K\sqrt{7225-K^2}+7225\sin^{-1}\left(\frac{K}{85}\right)\right)=$$
$$\frac{1}{170} S\left(-7225\,i\,\text{sinh}^{-1}\left(\frac{i\,K}{85}\right)+K\sqrt{7225-K^2}\right)$$

$\text{sd}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function sd

$\text{sn}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function sn

$\sinh^{-1}(x)$ is the inverse hyperbolic sine function

i is the imaginary unit

Again, from the indefinite integral result

$$\int \frac{1}{170} S\left(K\sqrt{7225-K^2}+7225\sin^{-1}\left(\frac{K}{85}\right)\right)dK =$$
$$\frac{1}{510}\sqrt{7225-K^2}\left(K^2+14450\right)S+\frac{85}{2}KS\sin^{-1}\left(\frac{K}{85}\right)+\text{constant}$$

we obtain for K = k:

1/510 sqrt(7225 - k^2) (14450 + k^2) S + 85/2 k S sin^(-1)(k/85)

Input

$$\frac{1}{510}\sqrt{7225-k^2}\left(14450+k^2\right)S+\frac{85}{2}kS\sin^{-1}\left(\frac{k}{85}\right)$$

$\sin^{-1}(x)$ is the inverse sine function

Expanded form

$$\frac{1}{510}\sqrt{7225-k^2}\,k^2S+\frac{85}{3}\sqrt{7225-k^2}\,S+\frac{85}{2}kS\sin^{-1}\left(\frac{k}{85}\right)$$

Alternate forms

$$\frac{1}{510}S\left(\sqrt{7225-k^2}\left(k^2+14450\right)+21675k\sin^{-1}\left(\frac{k}{85}\right)\right)$$

$$\frac{1}{510}\sqrt{85-k}\,\sqrt{k+85}\left(k^2+14450\right)S+\frac{85}{2}kS\sin^{-1}\left(\frac{k}{85}\right)$$

$$\frac{1}{510}S\left(\sqrt{7225-k^2}\,k^2+14450\sqrt{7225-k^2}+21675k\sin^{-1}\left(\frac{k}{85}\right)\right)$$

Real root

$-85\le k\le 85\,,\quad S=0$

Integer roots

$k = \pm 85\,, \quad S = 0$

$k = \pm 84\,, \quad S = 0$

$k = \pm 83\,, \quad S = 0$

$k = \pm 82\,, \quad S = 0$

$k = \pm 81\,, \quad S = 0$

Number of integer solutions

171

Property as a function

Parity

odd

Root for the variable S

$S = 0$

Series expansion at k=0

$$\frac{7225\,S}{3} + \frac{k^2\,S}{2} - \frac{k^4\,S}{173\,400} + O\left(k^5\right)$$

(Taylor series)

Series expansion at k=∞

$$-\frac{k^3\,(k\,S)}{510\sqrt{-k^2}}+\frac{85\,k\,S\left(\sqrt{-k^2}\,-2\,i\,k\log(k)+k\left(\pi+i\log\left(\frac{7225}{4}\right)\right)\right)}{4\,k}-$$
$$\frac{614125\left(\left(3\sqrt{-k^2}\,-2\,i\,k\right)S\right)}{16\,k\,k}-\frac{4437053125\left(\left(8\sqrt{-k^2}\,-9\,i\,k\right)S\right)}{192\,k\,k^3}+O\left(\left(\frac{1}{k}\right)^4\right)$$

(generalized Puiseux series)

log(x) is the natural logarithm

Derivative

$$\frac{\partial}{\partial k}\left(\frac{1}{510}\sqrt{7225-k^2}\,\left(14450+k^2\right)S+\frac{85}{2}\,k\,S\sin^{-1}\left(\frac{k}{85}\right)\right)=$$
$$\frac{S\left(-k^3+7225\sqrt{7225-k^2}\,\sin^{-1}\left(\frac{k}{85}\right)+7225\,k\right)}{170\sqrt{7225-k^2}}$$

Indefinite integral

$$\int\left(\frac{1}{510}\sqrt{7225-k^2}\,\left(14450+k^2\right)S+\frac{85}{2}\,k\,S\sin^{-1}\left(\frac{k}{85}\right)\right)dk=$$
$$\frac{S\left(k\sqrt{7225-k^2}\,\left(2\,k^2+93925\right)+21675\left(4\,k^2+7225\right)\sin^{-1}\left(\frac{k}{85}\right)\right)}{4080}+\text{constant}$$

From the indefinite integral result

$$\int\left(\frac{1}{510}\sqrt{7225-k^2}\,\left(14450+k^2\right)S+\frac{85}{2}\,k\,S\sin^{-1}\left(\frac{k}{85}\right)\right)dk=$$
$$\frac{S\left(k\sqrt{7225-k^2}\,\left(2\,k^2+93925\right)+21675\left(4\,k^2+7225\right)\sin^{-1}\left(\frac{k}{85}\right)\right)}{4080}+\text{constant}$$

we obtain:

(S (k sqrt(7225 - k^2) (93925 + 2 k^2) + 21675 (7225 + 4 k^2) sin^(-1)(k/85)))/4080

for k = 2 and S = 4:

(4 (2 sqrt(7225 - 2^2) (93925 + 2*2^2) + 21675 (7225 + 4*2^2) sin^(-1)(2/85)))/4080

Input

$$\frac{4\left(2\sqrt{7225-2^2}\ \left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080}$$

$\sin^{-1}(x)$ is the inverse sine function

Exact Result

$$\frac{187\,866\sqrt{7221}\ +156\,948\,675\sin^{-1}\left(\frac{2}{85}\right)}{1020}$$

(result in radians)

Decimal approximation

19271.999852358636247574861405727634640493912705802553711737497151

…

(result in radians)

19271.9998523586….

Property

$$\frac{187\,866\sqrt{7221}\ +156\,948\,675\sin^{-1}\left(\frac{2}{85}\right)}{1020}$$ is a transcendental number

Expanded form

$$\frac{31\,311\sqrt{7221}}{170}+\frac{615\,485}{4}\sin^{-1}\left(\frac{2}{85}\right)$$

Alternate forms

$$\frac{1}{340}\left(62\,622\sqrt{7221}+52\,316\,225\sin^{-1}\left(\frac{2}{85}\right)\right)$$

$$\frac{31\,311\sqrt{7221}}{170}+\frac{615\,485}{4}\tan^{-1}\left(\frac{2}{\sqrt{7221}}\right)$$

$$\frac{31\,311\sqrt{7221}}{170}-\frac{615\,485}{4}i\log\left(\frac{\sqrt{7221}}{85}+\frac{2i}{85}\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

$\log(x)$ is the natural logarithm

Alternative representations

$$\frac{4\left(2\sqrt{7225-2^2}\ \left(93\,925+2\times2^2\right)+21\,675\left(7225+4\times2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080}=\frac{4\left(156\,948\,675\,\mathrm{sd}^{-1}\left(\frac{2}{85}\,\middle|\,0\right)+187\,866\sqrt{7221}\right)}{4080}$$

$$\frac{4\left(2\sqrt{7225-2^2}\ \left(93\,925+2\times2^2\right)+21\,675\left(7225+4\times2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080}=\frac{4\left(156\,948\,675\,\mathrm{sn}^{-1}\left(\frac{2}{85}\,\middle|\,0\right)+187\,866\sqrt{7221}\right)}{4080}$$

$$\frac{4\left(2\sqrt{7225-2^2}\ \left(93\,925+2\times2^2\right)+21\,675\left(7225+4\times2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080}=\frac{4\left(156\,948\,675\,i\,\sinh^{-1}\left(-\frac{2i}{85}\right)+187\,866\sqrt{7221}\right)}{4080}$$

$\mathrm{sd}^{-1}(x\mid m)$ is the inverse of the Jacobi elliptic function sd

$\text{sn}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function sn

$\sinh^{-1}(x)$ is the inverse hyperbolic sine function

i is the imaginary unit

Series representations

$$\frac{4\left(2\sqrt{7225-2^2}\,\left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080}=$$
$$\frac{31\,311\sqrt{7221}}{170}+\frac{615\,485}{4}\sum_{k=0}^{\infty}\frac{\left(\frac{85}{2}\right)^{-1-2k}\left(\frac{1}{2}\right)_k}{k!+2\,k\,k!}$$

$$\frac{4\left(2\sqrt{7225-2^2}\,\left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080}=$$
$$\frac{31\,311\sqrt{7221}}{170}-\frac{615\,485\,\pi}{8}+\frac{7241}{2}\sqrt{\frac{7395}{2}}\sum_{k=0}^{\infty}\frac{\left(\frac{87}{170}\right)^k\left(\frac{1}{2}\right)_k}{k!+2\,k\,k!}$$

$$\frac{4\left(2\sqrt{7225-2^2}\,\left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080}=$$
$$\frac{31\,311\sqrt{7221}}{170}+\frac{615\,485}{8}\sqrt{\pi}\sum_{k=0}^{\infty}\frac{{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};z_0^2\right)\left(\frac{4}{85}-2\,z_0\right)^k z_0^{1-k}}{k!}$$

for $(z_0 \notin \mathbb{R}$ or $((\text{not } 1 \le z_0 < \infty)$ and $(\text{not } -\infty < z_0 \le -1)))$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

${}_p\tilde{F}_q(a_1, \ldots, a_p; b_1, \ldots, b_q; z)$ is the regularized generalized hypergeometric function

$\mathbb{R}$ is the set of real numbers

Integral representations

$$\frac{4\left(2\sqrt{7225-2^2}\,\left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080}=$$
$$\frac{31\,311\sqrt{7221}}{170}+\frac{7241}{2}\int_0^1\frac{1}{\sqrt{1-\frac{4t^2}{7225}}}\,dt$$

$$\frac{4\left(2\sqrt{7225-2^2}\,\left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080}=$$
$$\frac{31\,311\sqrt{7221}}{170}-\frac{7241\,i}{8\,\pi^{3/2}}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(\frac{7225}{7221}\right)^s\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)ds\quad\text{for}\quad 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representation

$$\frac{4\left(2\sqrt{7225-2^2}\,\left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080}=$$
$$\frac{1}{170}\sqrt{7221}\left(31\,311+\frac{7241}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-\frac{8\left\lfloor\frac{1+k}{2}\right\rfloor\left(-1+2\left\lfloor\frac{1+k}{2}\right\rfloor\right)}{7225}}{1+2k}}\right)=$$
$$\frac{1}{170}\sqrt{7221}\left(31\,311+\frac{7241}{1+-\frac{8}{7225\left(3-\frac{8}{7225\left(5-\frac{48}{7225\left(7-\frac{48}{7225\,(9+\ldots)}\right)}\right)}\right)}}\right)$$

$\lfloor x \rfloor$ is the floor function

$\mathop{\mathrm{K}}_{k=k_1}^{k_2} a_k / b_k$ is a continued fraction

From which:

1/4((4 (2 sqrt(7225 - 2^2) (93925 + 2*2^2) + 21675 (7225 + 4*2^2) sin^(-1)(2/85)))/4080)-521-199-2

Input

$$\frac{1}{4}\times\frac{4\left(2\sqrt{7225-2^2}\,\left(93\,925+2\times2^2\right)+21\,675\left(7225+4\times2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080}-521-199-2$$

$\sin^{-1}(x)$ is the inverse sine function

Exact Result

$$\frac{187\,866\sqrt{7221}+156\,948\,675\sin^{-1}\left(\frac{2}{85}\right)}{4080}-722$$

(result in radians)

Decimal approximation

4095.999963089659061893715351431908660123478176450638427934374287 9

…

(result in radians)

4095.999963089659…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above.

This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Property

$$-722+\frac{187\,866\sqrt{7221}+156\,948\,675\sin^{-1}\left(\frac{2}{85}\right)}{4080}$$ is a transcendental number

Expanded form

$$-722+\frac{31\,311\sqrt{7221}}{680}+\frac{615\,485}{16}\sin^{-1}\left(\frac{2}{85}\right)$$

Alternate forms

$$\frac{-981\,920+62\,622\sqrt{7221}+52\,316\,225\sin^{-1}\left(\frac{2}{85}\right)}{1360}$$

$$\frac{1}{680}\left(31\,311\sqrt{7221}-490\,960\right)+\frac{615\,485}{16}\sin^{-1}\left(\frac{2}{85}\right)$$

$$-722+\frac{31311\sqrt{7221}}{680}+\frac{615485}{16}\tan^{-1}\left(\frac{2}{\sqrt{7221}}\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Alternative representations

$$521-199-2=-722+\frac{4\left(2\sqrt{7225-2^2}\ \left(93925+2\times 2^2\right)+21675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-$$

$$\frac{4\left(156948675\,\text{sd}^{-1}\left(\frac{2}{85}\,\middle|\,0\right)+187866\sqrt{7221}\right)}{4\times 4080}$$

$$521-199-2=-722+\frac{4\left(2\sqrt{7225-2^2}\ \left(93925+2\times 2^2\right)+21675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-$$

$$\frac{4\left(156948675\,\text{sn}^{-1}\left(\frac{2}{85}\,\middle|\,0\right)+187866\sqrt{7221}\right)}{4\times 4080}$$

$$199-2=-722+\frac{4\left(2\sqrt{7225-2^2}\ \left(93925+2\times 2^2\right)+21675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-521-$$

$$\frac{4\left(156948675\,i\,\sinh^{-1}\left(-\frac{2i}{85}\right)+187866\sqrt{7221}\right)}{4\times 4080}$$

$\text{sd}^{-1}(x\mid m)$ is the inverse of the Jacobi elliptic function sd

$\text{sn}^{-1}(x\mid m)$ is the inverse of the Jacobi elliptic function sn

$\sinh^{-1}(x)$ is the inverse hyperbolic sine function

i is the imaginary unit

Series representations

$$\frac{4\left(2\sqrt{7225-2^2}\ \left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-$$
$$521-199-2=-722+\frac{31\,311\sqrt{7221}}{680}+\frac{615\,485}{16}\sum_{k=0}^{\infty}\frac{\left(\frac{85}{2}\right)^{-1-2k}\left(\frac{1}{2}\right)_k}{k!+2\,k\,k!}$$

$$\frac{4\left(2\sqrt{7225-2^2}\ \left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-521-199-$$
$$2=-722+\frac{31\,311\sqrt{7221}}{680}-\frac{615\,485\,\pi}{32}+\frac{7241}{8}\sqrt{\frac{7395}{2}}\sum_{k=0}^{\infty}\frac{\left(\frac{87}{170}\right)^k\left(\frac{1}{2}\right)_k}{k!+2\,k\,k!}$$

$$\frac{4\left(2\sqrt{7225-2^2}\ \left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-$$
$$521-199-2=-722+\frac{31\,311\sqrt{7221}}{680}+$$
$$\frac{615\,485}{32}\sqrt{\pi}\sum_{k=0}^{\infty}\frac{{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};z_0^2\right)\left(\frac{4}{85}-2\,z_0\right)^k\,z_0^{1-k}}{k!}$$

for $(z_0 \notin \mathbb{R}$ or $((\text{not } 1 \le z_0 < \infty)$ and $(\text{not } -\infty < z_0 \le -1)))$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

${}_p\tilde{F}_q(a_1, \ldots, a_p; b_1, \ldots, b_q; z)$ is the regularized generalized hypergeometric function

$\mathbb{R}$ is the set of real numbers

Integral representations

$$\frac{4\left(2\sqrt{7225-2^2}\ \left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-$$

$$521-199-2=-722+\frac{31\,311\sqrt{7221}}{680}+\frac{7241}{8}\int_0^1\frac{1}{\sqrt{1-\frac{4t^2}{7225}}}\,dt$$

$$\frac{4\left(2\sqrt{7225-2^2}\ \left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-$$

$$521-199-2=-722+\frac{31\,311\sqrt{7221}}{680}-$$

$$\frac{7241\,i}{32\,\pi^{3/2}}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(\frac{7225}{7221}\right)^s\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)ds\quad\text{for } 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representation

$$\frac{4\left(2\sqrt{7225-2^2}\ \left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-521-199-$$

$$2=-722+\frac{31\,311\sqrt{7221}}{680}+\frac{7241\sqrt{7221}}{680\left(1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\,\frac{-\frac{8\left\lfloor\frac{1+k}{2}\right\rfloor\left(-1+2\left\lfloor\frac{1+k}{2}\right\rfloor\right)}{7225}}{1+2k}\right)}=-722+$$

$$\frac{31\,311\sqrt{7221}}{680}+\frac{7241\sqrt{7221}}{680\left(1+-\frac{8}{7225\left(3-\frac{8}{7225\left(5-\frac{48}{7225\left(7-\frac{48}{7225\,(9+\ldots)}\right)}\right)}\right)}\right)}$$

$\lfloor x \rfloor$ is the floor function

$\mathop{\mathrm{K}}_{k=k_1}^{k_2} a_k / b_k$ is a continued fraction

27sqrt(1/4((4 (2 sqrt(7225 - 2^2) (93925 + 2*2^2) + 21675 (7225 + 4*2^2) sin^(-1)(2/85)))/4080)-521-199-2)+1

Input

$$27\sqrt{\left(\frac{1}{4}\times\frac{4\left(2\sqrt{7225-2^2}\,\left(93\,925+2\times2^2\right)+21\,675\left(7225+4\times2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080}-521-199-2\right)}+1$$

$\sin^{-1}(x)$ is the inverse sine function

Exact Result

$$1+27\sqrt{\frac{187\,866\sqrt{7221}+156\,948\,675\sin^{-1}\left(\frac{2}{85}\right)}{4080}-722}$$

(result in radians)

Decimal approximation

1728.999992214224940828190167584508829854599310362356501049440834 4

…

(result in radians)

1728.99999….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number).

Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Property

$$1+27\sqrt{-722+\frac{187866\sqrt{7221}+156948675\sin^{-1}\left(\frac{2}{85}\right)}{4080}}$$

is a transcendental number

Alternate forms

$$1+\frac{27}{4}\sqrt{-11552+\frac{62622\sqrt{7221}}{85}+615485\sin^{-1}\left(\frac{2}{85}\right)}$$

$$\frac{1}{340}\left(340+27\sqrt{85\left(-981920+62622\sqrt{7221}+52316225\sin^{-1}\left(\frac{2}{85}\right)\right)}\right)$$

$$1+27\sqrt{\frac{187866\sqrt{7221}+156948675\tan^{-1}\left(\frac{2}{\sqrt{7221}}\right)}{4080}-722}$$

$\tan^{-1}(x)$ is the inverse tangent function

Alternative representations

$$27\sqrt{\left(\frac{4\left(2\sqrt{7225-2^2}\left(93925+2\times2^2\right)+21675\left(7225+4\times2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times4}-521-199-2\right)+1}=$$

$$1+27\sqrt{-722+\frac{4\left(156948675\,\mathrm{sd}^{-1}\left(\frac{2}{85}\,\middle|\,0\right)+187866\sqrt{7221}\right)}{4\times4080}}$$

$$27\sqrt{\left(\frac{4\left(2\sqrt{7225-2^2}\ \left(93925+2\times 2^2\right)+21675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-521-199-2\right)}+1=1+27\sqrt{-722+\frac{4\left(156948675\,\mathrm{sn}^{-1}\left(\frac{2}{85}\,\middle|\,0\right)+187866\sqrt{7221}\right)}{4\times 4080}}$$

$$27\sqrt{\left(\frac{4\left(2\sqrt{7225-2^2}\ \left(93925+2\times 2^2\right)+21675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-521-199-2\right)}+1=1+27\sqrt{-722+\frac{4\left(156948675\,i\,\sinh^{-1}\left(-\frac{2i}{85}\right)+187866\sqrt{7221}\right)}{4\times 4080}}$$

$\mathrm{sd}^{-1}(x\mid m)$ is the inverse of the Jacobi elliptic function sd

$\mathrm{sn}^{-1}(x\mid m)$ is the inverse of the Jacobi elliptic function sn

$\sinh^{-1}(x)$ is the inverse hyperbolic sine function

i is the imaginary unit

Series representations

$$27\sqrt{\left(\frac{4\left(2\sqrt{7225-2^2}\,\left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-521-199-2\right)}+1=$$

$$1+27\sqrt{-722+\frac{31\,311\sqrt{7221}}{680}+\frac{615\,485}{16}\sum_{k=0}^{\infty}\frac{\left(\frac{85}{2}\right)^{-1-2k}\left(\frac{1}{2}\right)_k}{k!+2\,k\,k!}}$$

$$27\sqrt{\left(\frac{4\left(2\sqrt{7225-2^2}\,\left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-521-199-2\right)}+1=$$

$$1+27\sqrt{-722+\frac{187\,866\sqrt{7221}+156\,948\,675\left(-\frac{\pi}{2}+\sqrt{\frac{174}{85}}\,\sum_{k=0}^{\infty}\frac{\left(\frac{87}{170}\right)^k\left(\frac{1}{2}\right)_k}{(1+2k)\,k!}\right)}{4080}}$$

$$27\sqrt{\left(\frac{4\left(2\sqrt{7225-2^2}\,\left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-521-199-2\right)}+1=$$

$$1+27\sqrt{-722+\frac{31\,311\sqrt{7221}}{680}-\frac{615\,485\,\pi}{32}+\frac{7241}{8}\sqrt{\frac{7395}{2}}\,\sum_{k=0}^{\infty}\frac{\left(\frac{87}{170}\right)^k\left(\frac{1}{2}\right)_k}{k!+2\,k\,k!}}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

Integral representations

$$27\sqrt{\left(\frac{4\left(2\sqrt{7225-2^2}\,\left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-521-199-2\right)}+1=1+27\sqrt{-722+\frac{31\,311\sqrt{7221}}{680}+\frac{7241}{8}\int_0^1\frac{1}{\sqrt{1-\frac{4t^2}{7225}}}\,dt}$$

$$27\sqrt{\left(\frac{4\left(2\sqrt{7225-2^2}\,\left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-521-199-2\right)}+1=1+27\sqrt{\left(-722+\frac{31\,311\sqrt{7221}}{680}-\frac{7241\,i}{32\,\pi^{3/2}}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(\frac{7225}{7221}\right)^s\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)ds\right)}\quad\text{for } 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representations

$$27\sqrt{\left(\frac{4\left(2\sqrt{7225-2^2}\ \left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)}{4080\times 4}-521-199-2\right)}+1=$$

$$1+27\sqrt{-722+\frac{187\,866\sqrt{7221}+\frac{43\,446\sqrt{7221}}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-\frac{8\left\lfloor\frac{1+k}{2}\right\rfloor\left(-1+2\left\lfloor\frac{1+k}{2}\right\rfloor\right)}{7225}}{1+2k}}}{4080}}=$$

$$1+27\sqrt{-722+\frac{187\,866\sqrt{7221}+\frac{43\,446\sqrt{7221}}{8}}{4080}}$$

(27sqrt(1/4((4 (2 sqrt(7225 - 2^2) (93925 + 2*2^2) + 21675 (7225 + 4*2^2) sin^(-1)(2/85)))/4080)-521-199-2)+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\left(27\sqrt{\left(\frac{1}{4}\times\frac{1}{4080}4\left(2\sqrt{7225-2^2}\ \left(93\,925+2\times 2^2\right)+21\,675\left(7225+4\times 2^2\right)\sin^{-1}\left(\frac{2}{85}\right)\right)-521-199-2\right)}+1\right)\wedge(1/15)+C_{\mathrm{MRB}}{}^{1-1/(4\pi)+\pi}$$

$\sin^{-1}(x)$ is the inverse sine function

C_{MRB} is the MRB constant

Exact Result

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\sqrt[15]{1+27\sqrt{\frac{187\,866\sqrt{7221}+156\,948\,675\sin^{-1}\left(\frac{2}{85}\right)}{4080}-722}}$$

(result in radians)

Decimal approximation

1.64493802363678134385754342336826619343131526533256869788037989 51

…

(result in radians)

1.64493802363…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\sqrt[15]{1+\frac{27}{4}\sqrt{-11\,552+\frac{62\,622\sqrt{7221}}{85}+615\,485\sin^{-1}\left(\frac{2}{85}\right)}}$$

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\sqrt[15]{1+27\sqrt{\frac{187\,866\sqrt{7221}+156\,948\,675\tan^{-1}\left(\frac{2}{\sqrt{7221}}\right)}{4080}-722}}$$

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\frac{\sqrt[15]{\frac{1}{85}\left(340+27\sqrt{85\left(-981\,920+62\,622\sqrt{7221}+52\,316\,225\sin^{-1}\left(\frac{2}{85}\right)\right)}\right)}}{2^{2/15}}$$

Observations and conclusions

Electromagnetic phenomena accompany periods of earthquakes, and which at that time often take the place of telluric motions. In addition to this, they predominate every year during one or two months which chooses between March and May or, at the latest, enters June and July. **The activity of the sun is the center of electromagnetic phenomena** (Michele Stefano De Rossi – "Meteorologia Endogena")

Recall that tidal force (generally used in the plural, tidal forces or tidal forces, and also with the expression tidal effects) is a secondary effect of the **force of gravity**. Tidal effects from different bodies can add up, as in the case of the alignment between the Moon and the Sun which gives rise to intense syzygial tides.

The undoubted correlation that Prof. De Rossi felt between the Corleone earthquakes and those of Monte Baldo last year moved me to pay special attention to the latter as well. Rummaging through the scientific yearbooks, I found the precise dates of the strongest earthquakes felt in 1866 on the slopes of Monte Baldo, namely: 13 June, 11 August and 7-8 November, which correspond to the new moons; in 1870 seismic activity reawakened there, but I don't know the dates; in 1876 the first strong shock occurred on April 23, that is, on the eve of the new moon; with the perigee (which took place on the 26th) the shocks prepared by the new moon continued until the 29th; then the frequency decreased until May 4th and it already seemed to have left those populations in peace; except that the next coincidence of the new moon with the perigee and with a strong northern declination (in which position, as I already said, one of the two passages to the meridian is an energetic occasion for an earthquake) provided me with such a clue of awakening, probably on a greater extent of land , that here I prepared myself for careful surveillance, so as not to miss the most important phases of the phenomenon, when this happened. I mentioned this probability to Prof. Don Timoteo Bertelli of Florence in my letter of May 1st and to Prof. Goiran of Verona in a letter of the same 12th. The critical day otherwise passed peacefully in Trieste; not so in Monte Baldo, where the tremors resumed on the 22nd and continued on the 23rd, to be repeated on the 29th; at the same time in Corleone the activity, which had seemed almost extinguished since the 10th, was reawakened with a shock on the 20th, one on the 21st, four on the 24th and with great energy on the 25th. On May 22nd, the eve of the new moon, the very strong earthquake also occurred of Spoleto and at the time of the new moon in question there was, it can be said, no region of the Apennines in which seismic activity did not manifest itself with greater or lesser force, as can be seen from the bulletin.

In Monte Baldo there was a truce during June; in July the tremors resumed the day after the full moon and continued thereafter without interruption; in the following months tremors were noted on August 7th, September 5th, October 9th and November 4th, that is, almost always one or two days after the full moon. It is remarkable that on May 22nd and 23rd, while the rest of Italy was shaking, there was a truce in Corleone and then an immediate awakening, and the truce that occurred in the new moons following Monte Baldo in the face of energy is equally significant. manifested itself at the same time as Corleone, where the endogenous forces were transported by geological-mechanical effects, which it is not my task to erudite. In 1870, as far as I can remember, the seismic period of Monte Baldo put an end to that of Monte Nevoso (Julian Alps). This began on February 28th with a strong tremor at 12.20 pm; the next day the shocks were repeated and so also on the day of the new moon, March 2, and the following; after a fifteen-day truce a shock was felt at the full moon; then there were other tremors, the dates of which I could not know; those that came to my attention, and were the strongest, occurred on April 28th (the eve of the new moon), on May 10th, on May 15th (full moon), on June 2nd (near the new moon) and several between the 13th and the 19th. June (full moon period). Then the activity died down there and arose in Monte Baldo. Monte Nevoso was frequently subject to earthquakes; in relatively recent times there was a long period from November 1750 to May 1753; and in 1838 the populations remained in suspense for three months. That local area includes the city of Rijeka; and even in the small earthquakes, which occur here from time to time, I have observed a decided prevalence of syzygies. From this we see that some seismic periods, although limited within very narrow boundaries, can be the effect of a large telluric cause. I took the Corleone period into special consideration, because this is one of the few whose phases have been carefully studied and from which there is a sufficiently large number of shocks to draw positive consequences. There was another seismic period of recent memory and well studied, that of Belluno; the existing relationship between it and the lunar positions has no need of my demonstrations, because the illustrious Falb proved it since he predicted, based on his theories, the return of the phenomenon even during the course of the period itself.

Perhaps all the seismic phenomena that occur in Italy have as their cause, if not direct, at least determining, the action of the stars, but while on the one hand the lack of sufficient observations does not allow very extensive studies, on the other hand the translocation, which often happens, seismic centers distract the attention of investigators so as not to allow them to glimpse the effects of a great common cause in isolated phenomena.

It is desirable that the invitation made repeatedly by Prof. Cav. De Rossi, in order to obtain the greatest possible number of reports on seismic phenomena, must be listened to by those who have the progress of science at heart and that no one abstains from communicating even crude observations of such phenomena, the memory of which without this could be lost to the detriment of science. (**DELL' ATTRAZIONE LUNI- SOLARE IN RELAZIONE COI FENOMENI MAREO – SISMICI** - STUDI DIMOSTRATIVI DI GIULIO GRABLOVITZ – 1877)

In conclusion:

While **the activity of the sun is the center of electromagnetic phenomena,** the tidal force, hence the luni-solar attraction, is a secondary effect of the **force of gravity**. The **aurora borealis**, for example, is a phenomenon visually characterized by luminous bands that take on a wide range of shapes and colours, rapidly changing in time and space, usually red-green-blue in colour, called auroral arcs, caused from the interaction of charged particles (protons and electrons) of solar origin (solar wind) with the terrestrial ionosphere (atmosphere between 100-500 km): these particles excite the atoms of the atmosphere which, subsequently de-energizing, emit light of various lengths 'wave. Solar activity is a source of emission of **electromagnetic waves** and **electrically charged particles**, the luni-solar attraction, is a secondary effect of the **force of gravity**. It is therefore possible to hypothesize a connection, albeit indirect, between these phenomena and "**gravitational waves**" which, among other things, travel at a speed equal to c (speed of light), as well as **electromagnetic waves**. Thus, there is a purely mathematical connection between seismic waves and gravitational waves.

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

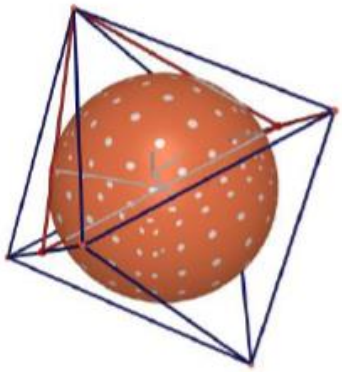


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.141939571526584308924330732196162632677513386811659044682541739 3

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

$4096 = 64^2$, (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$).

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.6180\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^8\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^8\right)^k}{k!}\right)\quad\text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$
$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi e^{0} \approx 3.1416$ (real, principal root)

$\pi e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1 \sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003$ (real, principal root)

$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003$ (real root)

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\,\pi\left\lfloor\frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{8}{\pi^2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} = \sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\;\sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} = \sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\mathrm{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13
…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\Big/\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}(C\times \mathrm{R}\times 2.33\cdot 10^{-13})}}\cong 1.61803398\ldots=\frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.618035912348264235440174408834709854254527350840173356306481810 7

…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\, x^2\, y\, z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$) is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.6018401361\times 10^{-24}\right)}}$$

1.618032997307532491506757016629746746422577260892967140791939590 3
…

1.6180329973075…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times10^{-35}}{1.1056\times10^{-52}}\times 1729\times 4.4525642121\times 10^{-24}\right)}}$$

Result

1.644932352102092130483898983704151168876621841655166877914166033 8
…

1.64493235210209213…. ≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times10^{-35}}{1.1056\times10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

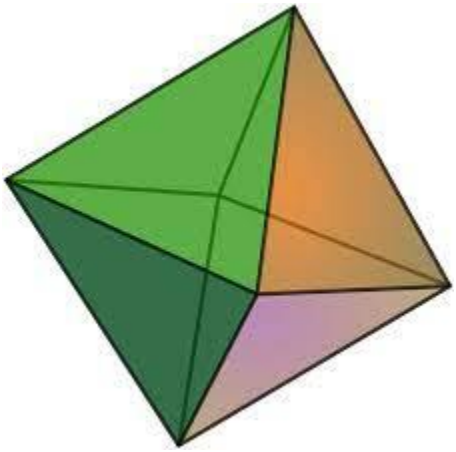
Result

3.14159225731469939939950039231605796469731171781644423955790024797

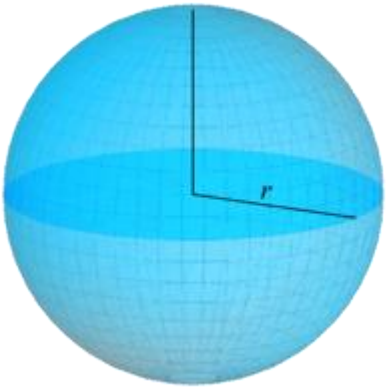
…

3.14159225731469…. ≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find a, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

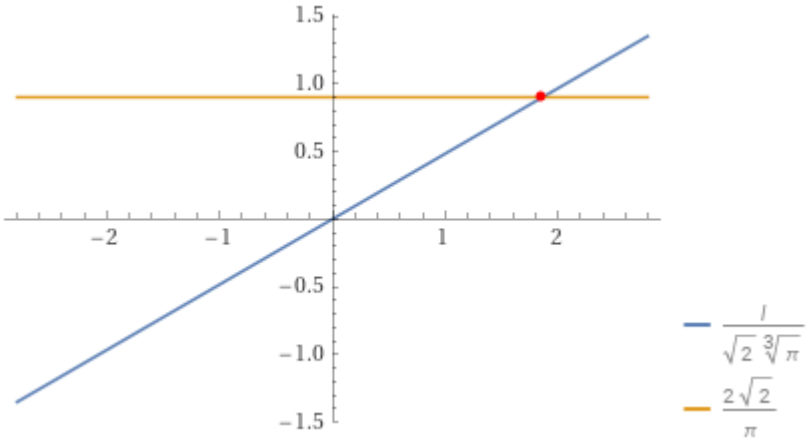
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,3}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not}\ (z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

$1.64381856858\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\wedge(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\text{^}(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\text{^}(1/15)\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)}\quad\text{for } (0<\gamma<-\operatorname{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

–5.010882647757...

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+...}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\,\sqrt{6}}\right)^2\right\} = 0$$

$$\text{for } b = -\frac{226\,802\,245}{18\,480\,874}$$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

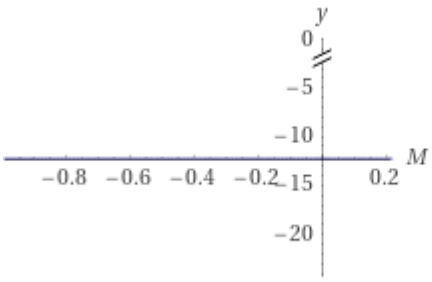
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

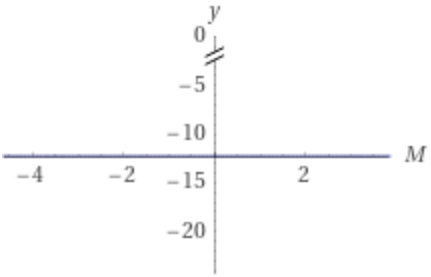
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

$$-12.2723$$

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V = \frac{1}{3}(0.0814845\,b + 1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

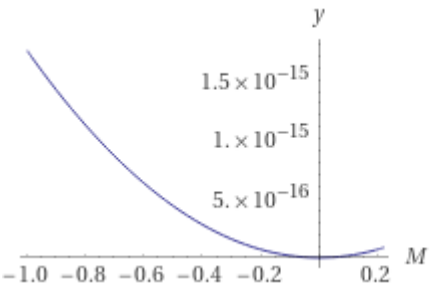
Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\,M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

Result:

0

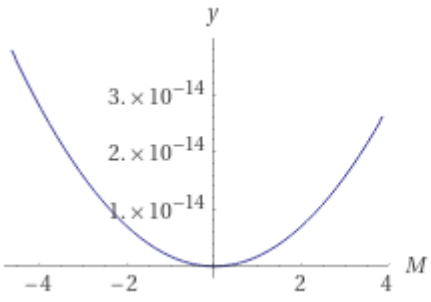
Plots: **(possible mathematical connection with an open string)**



(M from −1 to 0.2)

M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O(M^{62194})$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{1}{3}M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2\left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^{-16}

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times10^{-17}$

7.021621519159*10^-17

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

$1.57986484181*10^{-14}$

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 2^2 + 6.58545 \times 10^{-10}\sqrt{2^4}\right)}{2^2} + 1\right)^2 \times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_{0}}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\,\hat{}\,(1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

$5.729475 * 10^{-35}$ Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

$1.820306 * 10^{61}$ V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

$5.975498*10^{-8}$ V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

$1.042940*10^{27}$ V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

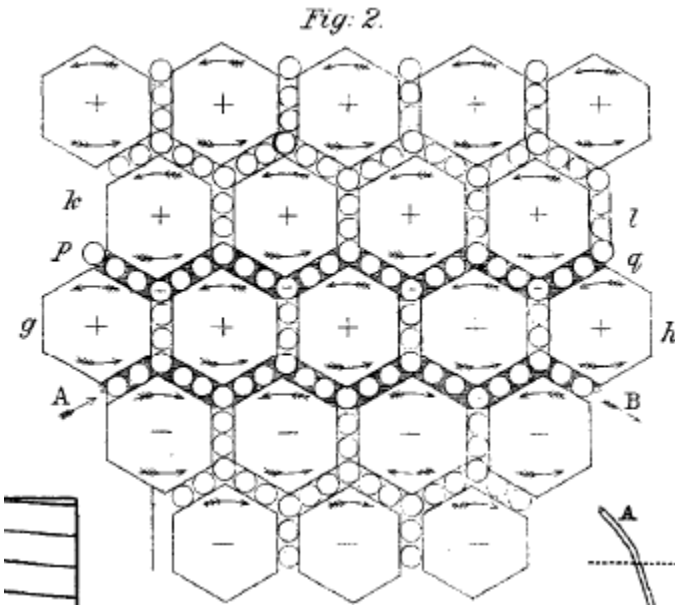
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

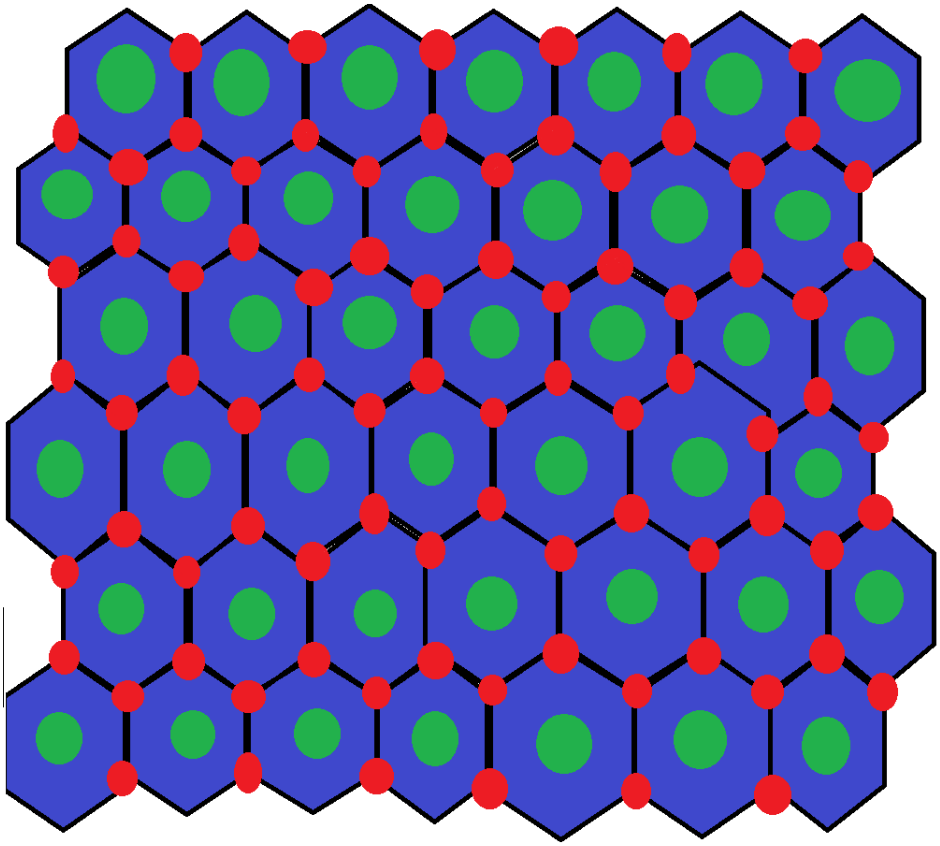
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On some equations concerning the seismology and the calculation relating to the tides and solar eclipses. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory V

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper (part V), we analyze some equations concerning the seismology and the calculation relating to the tides and solar eclipses. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory

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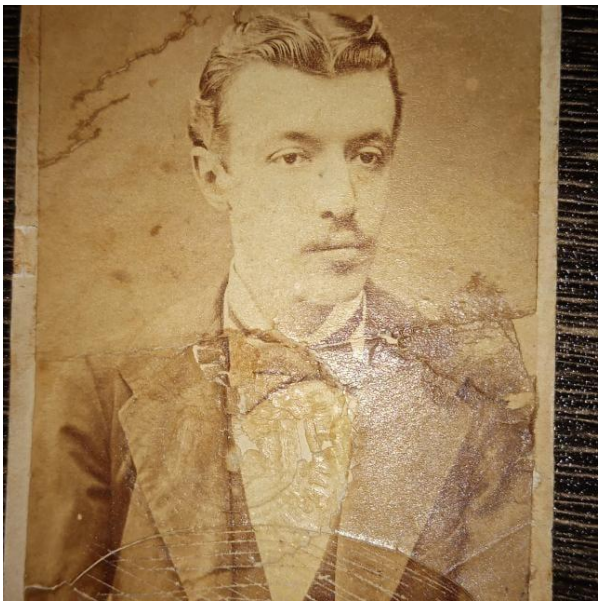
A. Nardelli studied at the Università degli Studi di Napoli Federico II - Dipartimento di Studi Umanistici – **Sezione Filosofia - scholar of Theoretical Philosophy**

Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

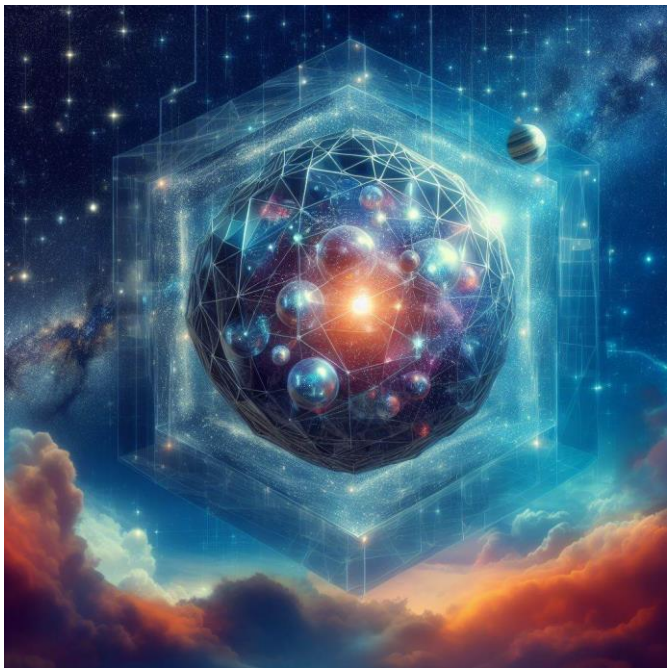
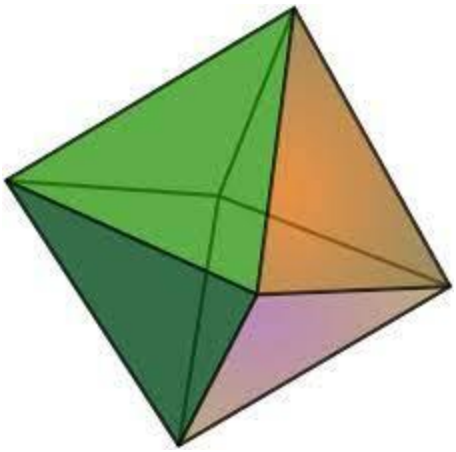
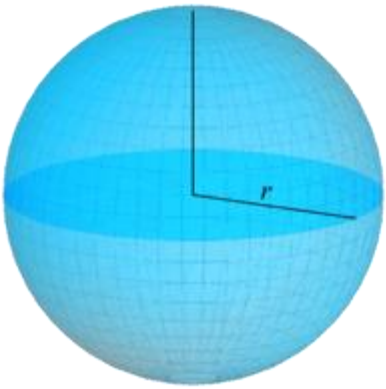


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\pi x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$l = 0, \quad x = 0$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt{2}\ \sqrt[3]{\pi}\right) = \log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\ \pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

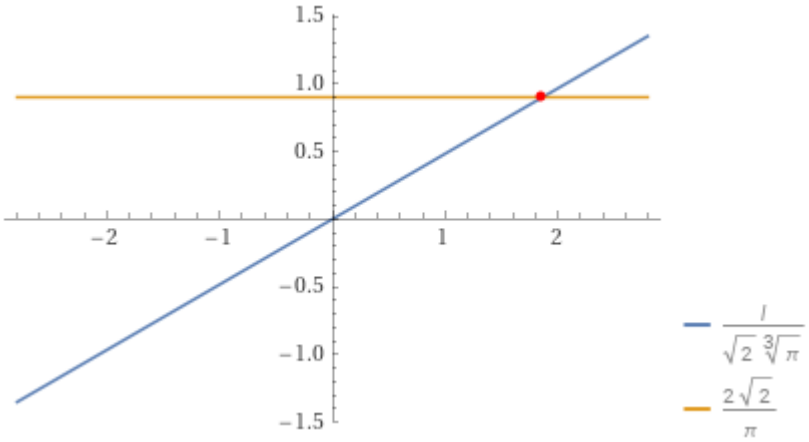
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

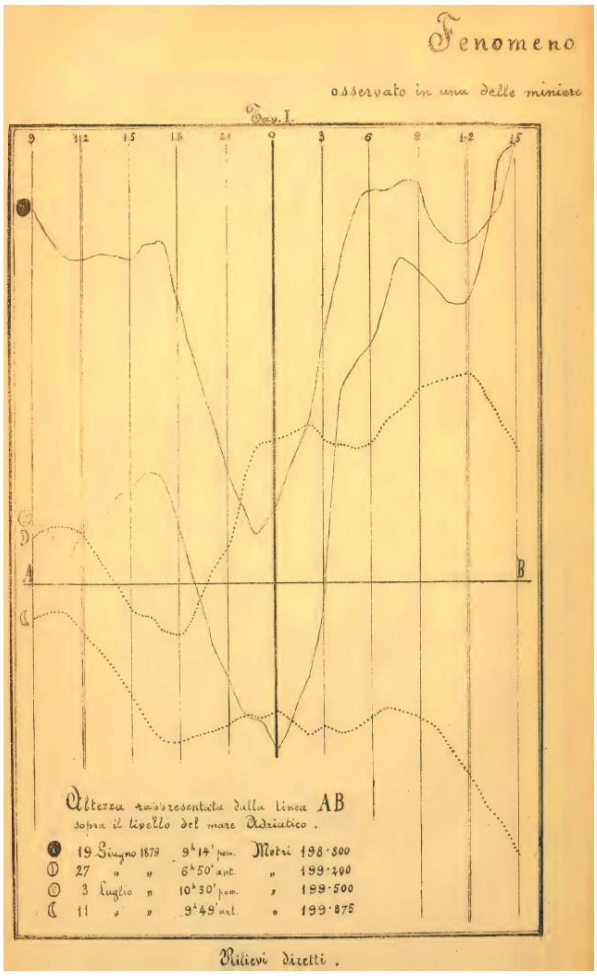
Plot

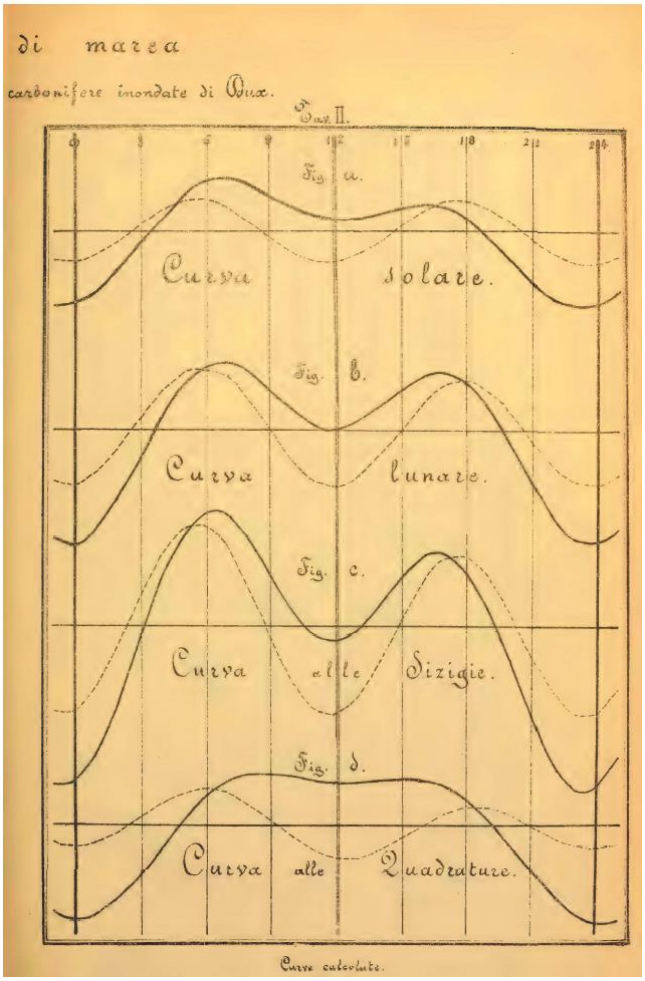


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

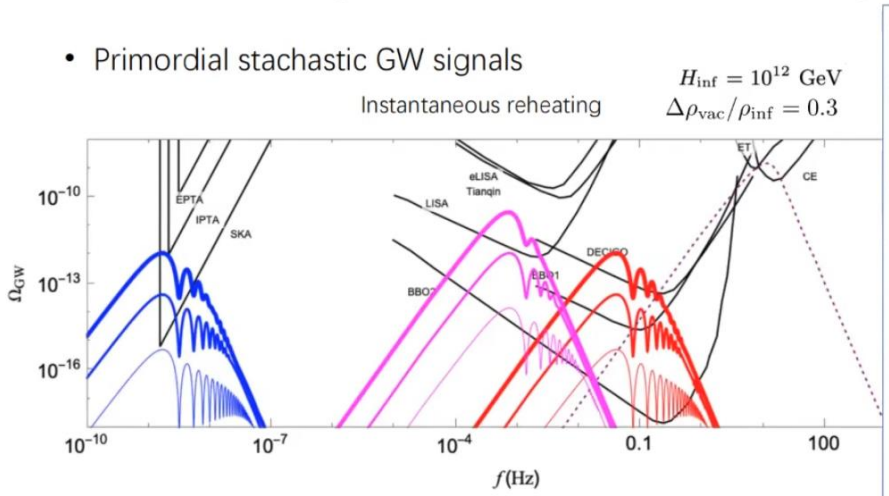

di marea
carbonifere inondate di Pux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

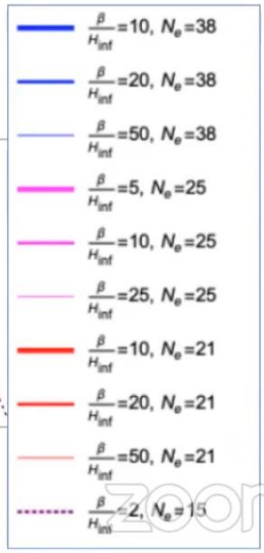
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

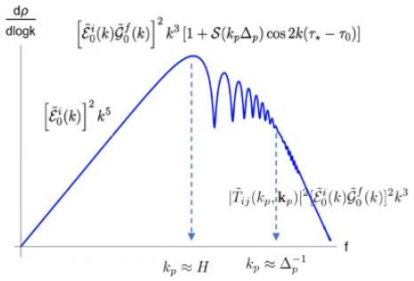
Comparison between primary GW and secondary GW

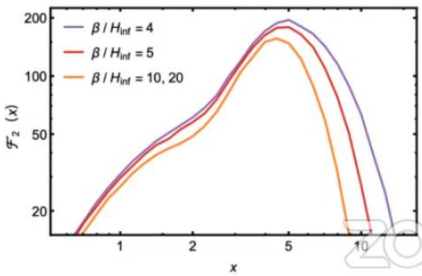
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





From Wikipedia

Now, we analyze the following three earthquakes:

The 1930 Irpinia and Vulture earthquake was an earthquake of moment magnitude 6.7 (X degree on the Mercalli scale) which occurred on 23 July 1930 with its epicenter in Irpinia, between Lacedonia and Bisaccia.

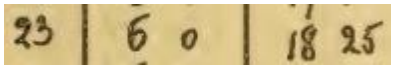
The earthquake also took its name from Mount Vulture, on whose slopes extensive damage occurred, and in any case it widely affected Basilicata, Campania and Puglia, causing its greatest destructive effects in the Apennine area between the provinces of Potenza, Matera, Avellino, Benevento and Foggia. The earthquake caused enormous damage and victims mainly in the provinces of Avellino and Potenza, affecting over 50 municipalities in 7 provinces.

The 1962 Irpinia earthquake was a seismic event that hit Irpinia and part of Sannio. The epicenter was located in the Campania Apennines in the municipality of Sant'Arcangelo Trimonte, at the time located in the province of Avellino. The main shocks occurred on August 21st at 4.56pm, 6.30pm and 7.09pm.

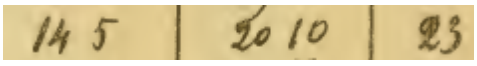
The 1980 Irpinia earthquake was an earthquake which occurred on 23 November 1980 and which struck central Campania and central-northern Basilicata, with part of the province of Foggia within the border with the two regions, involving, however, significantly the rest of southern Italy was also very reduced.

23.07.1930 01:08 6.7° R Irpinia 41° 03’ N 15° 22’ E

25 Luglio 1930	**LUNA NUOVA** alle 20:41		2°08′



high tide Ischia



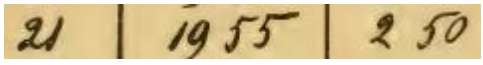
low high low high Venice

1h 27m after earthquake low tide Venice; 5h 52m after earthquake high tide Ischia

21.08.1962 18:30 6.3-6.4 R Irpinia 41° 05’ N 15° 03’ E

22 Agosto 1962	**Ultimo quarto**		29°44′

high tide Ischia



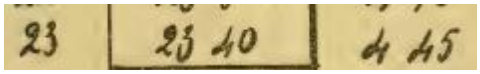
high low high low Venice

25 minutes before high tide earthquake Ischia; 1h 25m after high tide Venice

23.11.1980 19:34:52 6.9 R Irpinia 40° 48.57’ N 15° 18.41’ E

22 Novembre 1980	**LUNA PIENA** alle 06:38		0°06′

high tide Ischia



high low

high bassa Venice

1h 36m after earthquake high tide Ischia; 2h 39m before low tide earthquake Venice

We perform the following calculations:

(1.27 + 1.25 + 1.36)/3 = 1h 29.3m = 1.4883°

21h 10m = 21.16°

19h 55m = 19.916° M = 20° 32’ 17”

2h 35m = 2.583°

(20° 32' 17" - 2.583° - 1.4883°) = 16° 28’

(2+0.125)(20° 32' 17" - 1.4883°)

Input interpretation

$(2 + 0.125)$ (20 degrees 32 arcminutes 17 arcseconds – 1.4883° (degrees))

Results

40 degrees 28 arcminutes 51 arcseconds

40° 28 N 16° 28’ E = (Ferrandina Prov. Di Matera – 1h 22m – 112.8 Km da Rionero in Vulture (PZ) – 2h 04m – 159.2 Km da S. Angelo dei Lombardi (AV))

Or:

(2+((2√2)/(8Pi))) (20° 32' 17" - 1.4883°)

Input interpretation

$\left(2 + \frac{2\sqrt{2}}{8\pi}\right)$ (20 degrees 32 arcminutes 17 arcseconds – 1.4883° (degrees))

Results

40 degrees 14 arcminutes 36 arcseconds

40° 14’ N 16° 28’ E = (Tursi Prov. Di Matera – 1h 55m – 145.4 Km da Rionero in Vulture (PZ) – 2h 25m – 210.2 Km da S. Angelo dei Lombardi (AV))

From

NUOVA TEORIA SISMICA DELLE MAREE - BREVE ESPOSIZIONE DI *GIULIO GRABLOVITZ* – TRIESTE, STABILIMENTO TIPOGRAFICO APPOLONIO & CAPRIN – 1876

We have that:

Oltre a quanto si riferisce alla diretta osservazione delle maree, richiamo l'attenzione dei lettori sul terribile terremoto di Lisbona, in occasione del quale la linea di maggiore scuotimento, e la direzione delle scosse aveva con le Antille una relazione somigliante a quella del terremoto di Belluno (di cui parlerò nella seconda parte) con l'Etna.

Ricordo del pari la gran corrente marina conosciuta sotto il nome di *Gulf Stream*, che si cercò di spiegare in molti modi, senza giungere mai ad una conclusione teorica inoppugnabile; essa parte dal golfo del Messico e corre in direzione contraria al movimento che la rotazione diurna dovrebbe imprimerle e con una velocità superiore a quella delle altre correnti; la sua velocità diminuisce per altro verso le coste europee ove si scinde in due rami, l'uno dei quali si dirige al Nord e l'altro volge al Sud, poi all'Ovest rimettendosi nel senso delle correnti naturali, finchè, giunto presso le Antille e molto prima di battere contro alcuna costa, viene gagliardamente respinto, ed insieme alla corrente equatoriale, che viene respinta in pari guisa, come se una forza suprema sorgesse dal fondo del mare, va a formare la corrente contraria della Guinea. Nel punto in cui tali correnti retrocedono e da cui sembra aver principale origine il *Gulf Stream*, è da ricercarsi il radiante della marea, ossia il luogo della massima oscillazione del suolo. Esso è situato prossimamente a 10 lat. Nord ed a 35° Ovest Ferro.

La marea delle Antille estende i suoi effetti alle coste orientali d'America; nell'America meridionale non è molto estesa, almeno per quanto è lecito giudicare dalle ore dei porti, ma è assai sensibile alle

foci del fiume delle Amazzoni, mentre nell'America settentrionale si manifesta fino in Terranuova ed è energica nei punti più direttamente espostivi, segnatamente nella baia di Fundy, ove l'unità d'altezza è di 15 metri in circa.

Il primo punto d'Europa lambito dalla marea delle Antille è il punto a queste più vicino, cioè la foce del Tago; essa si manifesta successivamente su tutta la costa spagnuola, poi sulla francese; all'ingresso dello stretto di Gibilterra essa presenta qualche ineguaglianza (come nel passo di Calais) dovuta all'agglomeramento che dapprima si forma ed allo sfogo che poi trovano le acque nel passaggio; in conseguenza di ciò le ore tendono a rimanere stazionarie od a retrocedere alcun poco fino al passaggio dello stretto, appena varcato il quale riprendono l'ordine primitivo.

Varcato lo stretto di Gibilterra la marea s'affievolisce tanto che Malaga e le foci del Tetuan sono le ultime località in cui il suo movimento si possa ancora visibilmente apprezzare. Ora entriamo per un

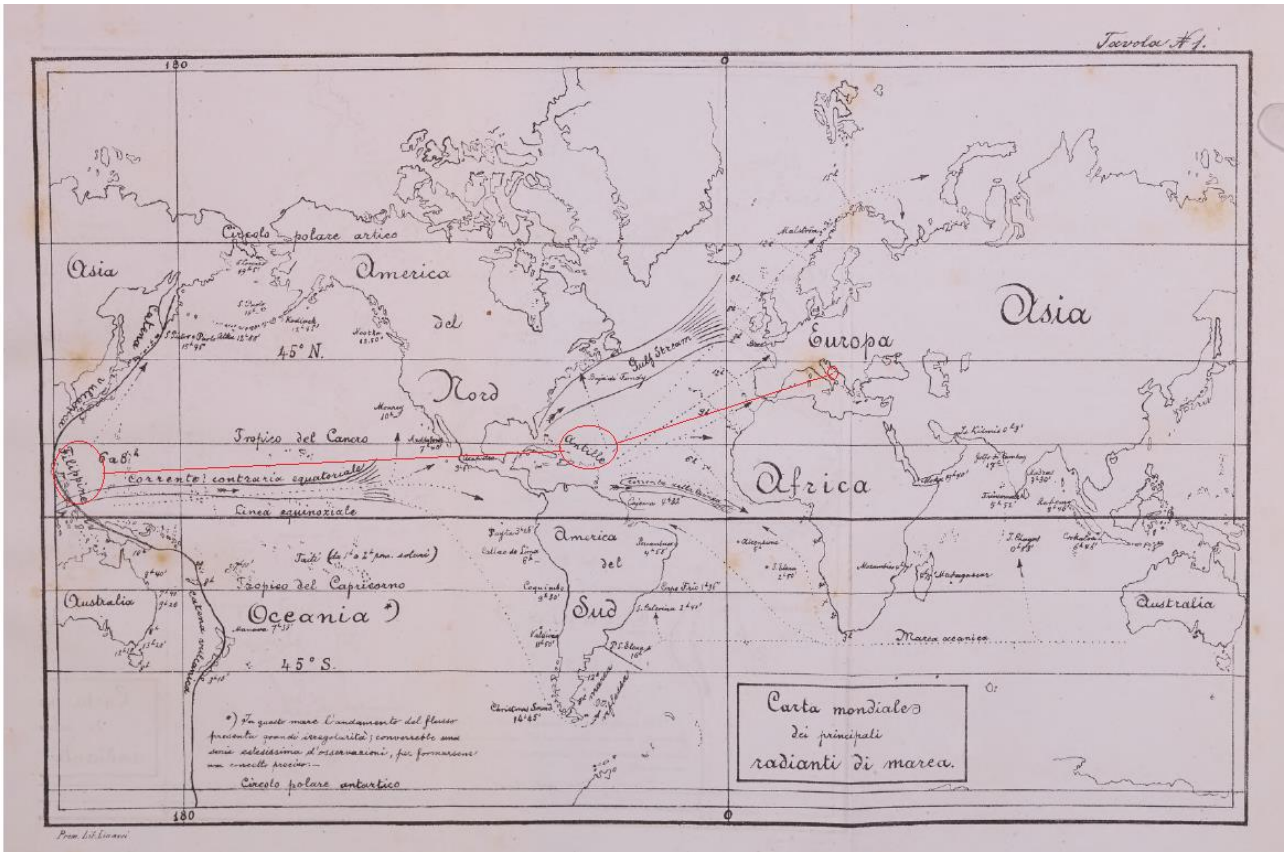
trattato è questo il primo caso in cui m'accade di poter attribuire il fenomeno ad una vera marea oceanica, obbediente *direttamente* all'attrazione luni-solare ed indipendente (o quasi) da cause sismiche. Essa ha origine alla latitudine del Capo di Buona Speranza nell'Oceano Indico e si farebbe sentire anche nell'Oceano Pacifico se non venisse turbata da altre maree più forti. A quest'ipotesi sono tratto dal fatto che questa marea ha luogo in tutto il suo corso, come dissi, entro quattro ore dopo il passaggio della luna al meridiano locale, e ciò accade nell'isola di Madagascar, nell'Africa meridionale, nelle isolette adiacenti e, come ho detto, sulle coste orientali del Brasile; essa si manifesta nel golfo del Bengala, nel mare d'Oman e nelle insenature del Golfo Persico e del Mar Rosso con un ritardo che mi sembra procedere con regolarità sufficiente nella naturalissima direzione di S. E. a N. O.; per poterne giudicare bene l'andamento converrebbe che le stazioni d'osservazione fossero più numerose e più opportunamente disposte. Che questa marea possa svilupparsi in modo indipendente da quelle delle Antille e delle Filippine, è

Nel presente trattato, ho preso in seria considerazione come si vede, soltanto tre radianti sismici; quello delle Antille e quello, non bene definito, delle Filippine hanno un' influenza mondiale; il terzo, quello dell' Adriatico, è d'importanza locale e si rende manifesto, solamente perchè ha influenza sulle acque d'un mare chiuso e non disturbato da altre maree. Tuttavia esso non può non destar interesse a tutto il mondo scientifico, perchè la sua posizione speciale non trova riscontro in alcun altro mare e fu perciò la chiave unica della mia nuova teoria. Non nego, anzi ammetto l'esistenza di moltissimi focolari di maree, ma questi in gran parte sfuggono e sfuggiranno ognora alle più diligenti ricerche, perchè i loro effetti vengono assai probabilmente celati od interamente paralizzati da maree più forti.

Debbo far osservare un' altra circostanza che conferma la mia teoria; i mari, in cui la marea oceanica sembra essere affatto indipendente da moti sismici, sono quelli in cui i centri vulcanici attivi sono più rari.

Come dissi nella prefazione, il presente trattatello non ha per iscopo che l'esposizione della nuova teoria; i particolari contengono senza dubbio difetti enormi, che soltanto la critica degli scienziati e le ulteriori investigazioni riusciranno ad eliminare. Frattanto ho voluto esporre rozzamente la mia idea; ora se la mia nuova teoria incontrerà (come spero non per vanità personale, bensì per amore al progresso delle scienze) favorevole accoglienza nel mondo scientifico, non è a dubitarsi che le osservazioni verranno estese viemmaggiormente, giacchè il calcolo delle

maree non si limiterebbe più a sorvegliare le proprietà di coloro che posseggono depositi esposti all'invasione del mare, ma si estenderebbe allo scopo, eminentemente scientifico, di stabilire la teoria del più terribile ed imponente fenomeno offertoci dalla natura, il terremoto; gioverebbe non poco alla navigazione per lo studio *teorico* delle correnti marine, e spanderebbe luce su molti altri fenomeni tuttora inesplicati, segnatamente sulla meteorologia, che finora non ebbe un successo paragonabile allo zelo, con cui vi si dedicano i nostri numerosi luminari della scienza.



Map by Prof. Giulio Grablovitz with the three seismic radiants of the Philippines, the Antilles and the Adriatic highlighted in red

Belluno – Etna

Aeolian Islands – Lombardy

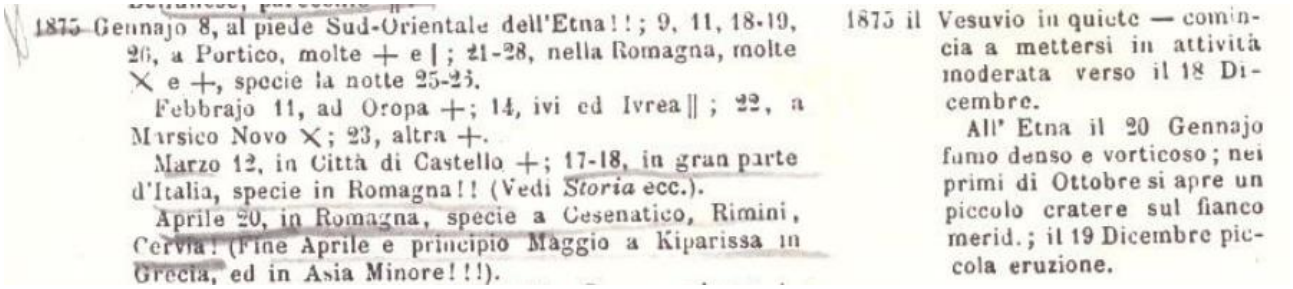
Adriatic seismic radiant, whose line of greatest shaking from Venice/Trieste reaches the coasts of northern Sicily (Veneto/Lombardia)

Nel 1875 il terremoto più importante fu quello del 18 Marzo, avvertito in gran parte d'Italia. Il primo movimento si manifestò alle 12.51 ant. ed *i primi centri di scuotimento alla superficie* (dice l'Annuario) *occuparono una linea diretta da Camerino verso Nord-Ovest*; dunque proveniva dalla Sicilia. La luna passava in quella notte al meridiano superiore alle $9^h\ 10'$ ed aveva una declinazione boreale di 23^0. Il terremoto avvenne dunque 3 o 4 ore dopo, ma fin dalle 11 pom. il declinometro dell'Osservatorio di Moncalieri era agitatissimo in senso verticale e l'agitazione continuò fin dopo la mezzanotte, cioè fino quasi all'istante del terremoto.

17.03.1875 23h 51m South-eastern Romagna earthquake

07.01 New moon

14.03 First quarter moon – 22.03 Full moon (M = 18.03)



1875 Gennajo 8, al piede Sud-Orientale dell'Etna!!; 9, 11, 18-19, 26, a Portico, molte + e |; 21-28, nella Romagna, molte × e +, specie la notte 25-26.

Febbrajo 11, ad Oropa +; 14, ivi ed Ivrea ‖; 22, a Marsico Novo ×; 23, altra +.

Marzo 12, in Città di Castello +; 17-18, in gran parte d'Italia, specie in Romagna!! (Vedi *Storia* ecc.).

Aprile 20, in Romagna, specie a Cesenatico, Rimini, Cervia! (Fine Aprile e principio Maggio a Kiparissa in Grecia, ed in Asia Minore!!!).

1875 il Vesuvio in quiete — comincia a mettersi in attività moderata verso il 18 Dicembre.

All'Etna il 20 Gennajo fumo denso e vorticoso; nei primi di Ottobre si apre un piccolo cratere sul fianco merid.; il 19 Dicembre piccola eruzione.

5.5 New Moon – 28.04 Last quarter moon

Sicily – Emilia Romagna – Piedmont (Biella) – Ivrea – Basilicata – Umbria (Città di Castello) Emilia Romagna – Greece – Asia Minor (Anatolia)

Gulf of Sirte – Sicily – Sardinian coasts – Neapolitan coasts – Lazio coasts - Adriatic

In un articolo che parla delle Sirti maggiore e minore (l' una delle quali è presentemente chiamata Golfo di Sidra, l' altra seno di Cabs), leggo che quest' ultima è notabile per la grande variazione delle sue maree a cagione dei venti di levante a cui è apertamente sottoposta; perchè ciò avvenisse, converrebbe che quei venti fossero periodici a seconda delle maree stesse; la mia ipotesi invece mi sembra sufficente a spiegare in qual modo le acque possano internarsi in quel golfo, il cui seno è rivolto al punto radiante. (V. Tavola N. 2).

Lo stabilimento del porto di Patrasso è di 6^h 54'; a prima vista potrà sembrare che ciò male si accordi con la mia teoria, perchè Patrasso, trovandosi vicino al punto radiante più assai della Sirti minore (il cui stabilimento è di 3^h 10') e delle bocche di Cattaro (3^h 45'), dovrebbe sentire l' urto della marea assai prima di queste due località; l' apparente sconcordanza sparisce, quando si rifletta che nei punti più vicini al movimento del suolo, il primo effetto è di necessità la bassa marea, perchè ivi è il suolo che si solleva e l' acqua necessariamente s' abbassa.

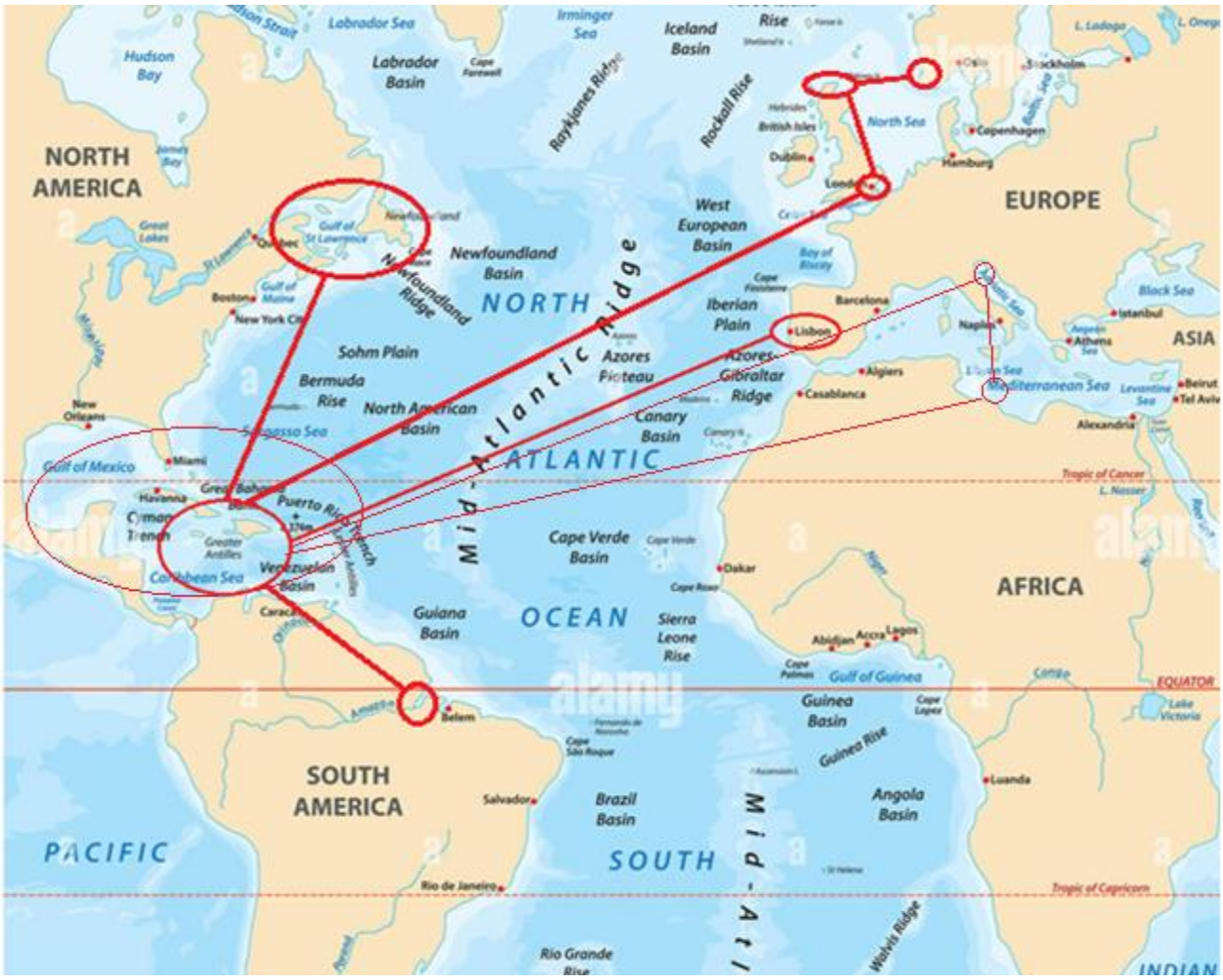
Fatta questa considerazione diventa un errore il calcolare lo stabilimento di quei punti in base all'alta marea, mentre converrebbe riferirlo alla bassa marea; in tal modo lo stabilimento del porto di Patrasso si ridurrebbe a 0^h 54′, cifra che non ha bisogno di commenti.

È ovvio che in tali punti debba invertirsi la legge riguardo la relazione ch'esiste fra salite e discese; vale a dire, le *salite* debbono essere proporzionali alle *discese*, da cui son *precedute*.

Nel resto del Mediterraneo le maree sono quasi insignificanti; in aggiunta a quanto già dissi in proposito, accenno di volo al modo singolare in cui si manifestano le maree a Messina; benchè manchino dati precisi, si sa che sono molto irregolari ed assai più repentine che nell'Adriatico, vale a dire che i momenti della massima e minima altezza si possono valutare ad occhio senza errore apprezzabile, mentre a Trieste od a Venezia il più attento osservatore può ingannarsi di 15 minuti, senza l'aiuto di strumenti autoregistratori. Ne attribuisco la causa alla grande vicinanza del punto radiante, verso il quale tutte le acque convergono *contemporaneamente* nel momento della massima depressione del suolo, mentre ne divergono nella stessa guisa nel caso opposto. Probabilmente l'imponente vortice di Cariddi ha relazione col fenomeno delle maree, tanto più che il terremoto avvenuto in Sicilia ed in Calabria dopo il mezzodì del 5 febbraio 1783 ne scemò, a quanto si asserisce, la violenza.

Esiste presso Negroponte un vortice assai temuto dai naviganti ed un andirivieni periodico della corrente nell'Euripo. Sarebbe anche questo un effetto del movimento del suolo?

Su questi ed altri fenomeni parlerò diffusamente in seguito, per dimostrare l'intimo rapporto ch'essi hanno col fenomeno delle maree, secondo la teoria esposta.



Lisbon - Antilles

Antilles – Northern Scotland – Thames Mouth – Westernmost point of Norway

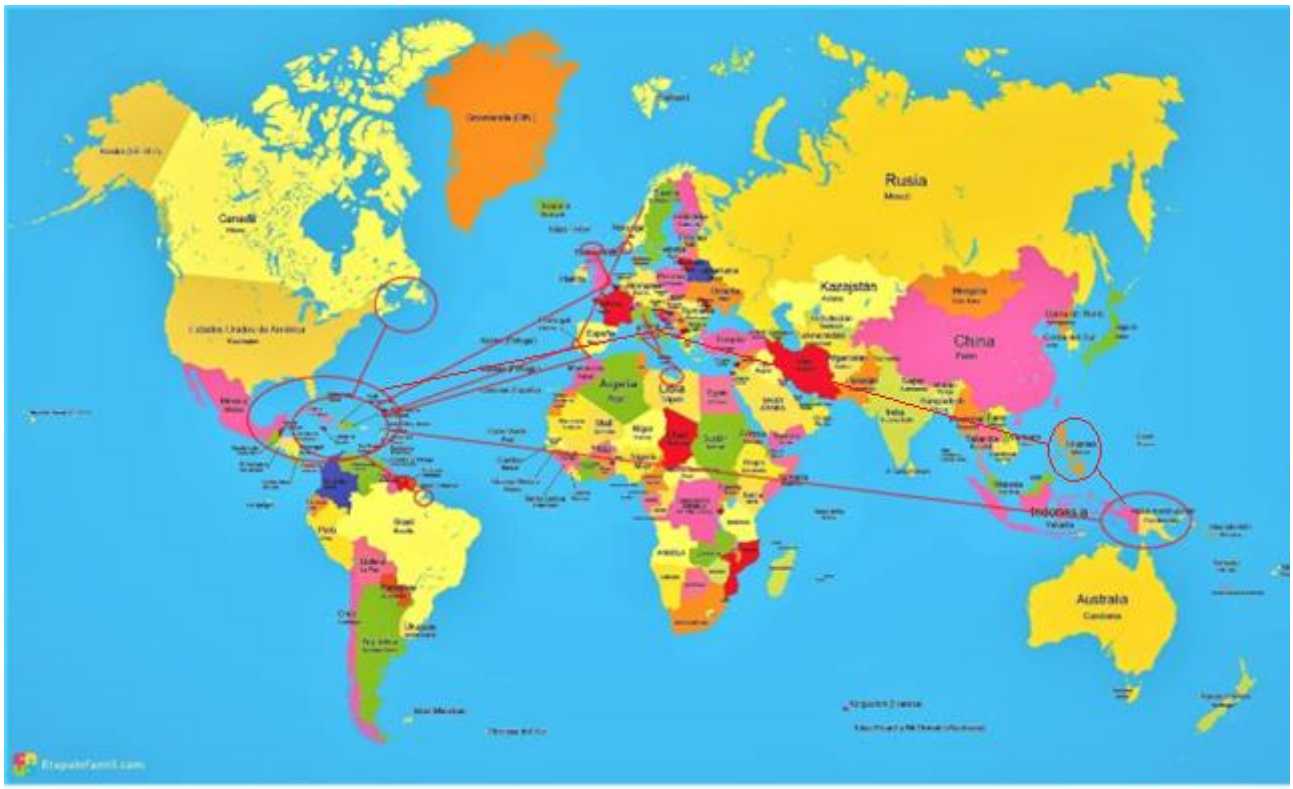
Antilles – Amazon River Mouth – Newfoundland/Bay of Fundy

Gulf of Sirte – Sicily/Messina – Venice/Trieste

Dalle descrizioni dei celebri terremoti di Lisbona (1 novembre 1755) e di Sicilia (febbraio e marzo 1783) si apprende che dopo il primo si manifestò un fortissimo vento di tramontana ed una marca di colossali proporzioni; nelle Antille ove la marea è normalmente di 75 centimetri, a quanto narra il Cantù, salì a 7 metri; il secondo fu pure accompagnato da straordinarie maree e da strani sconvolgimenti atmosferici, ed il Botta ne fa una dettagliata descrizione nella sua storia d' Italia.

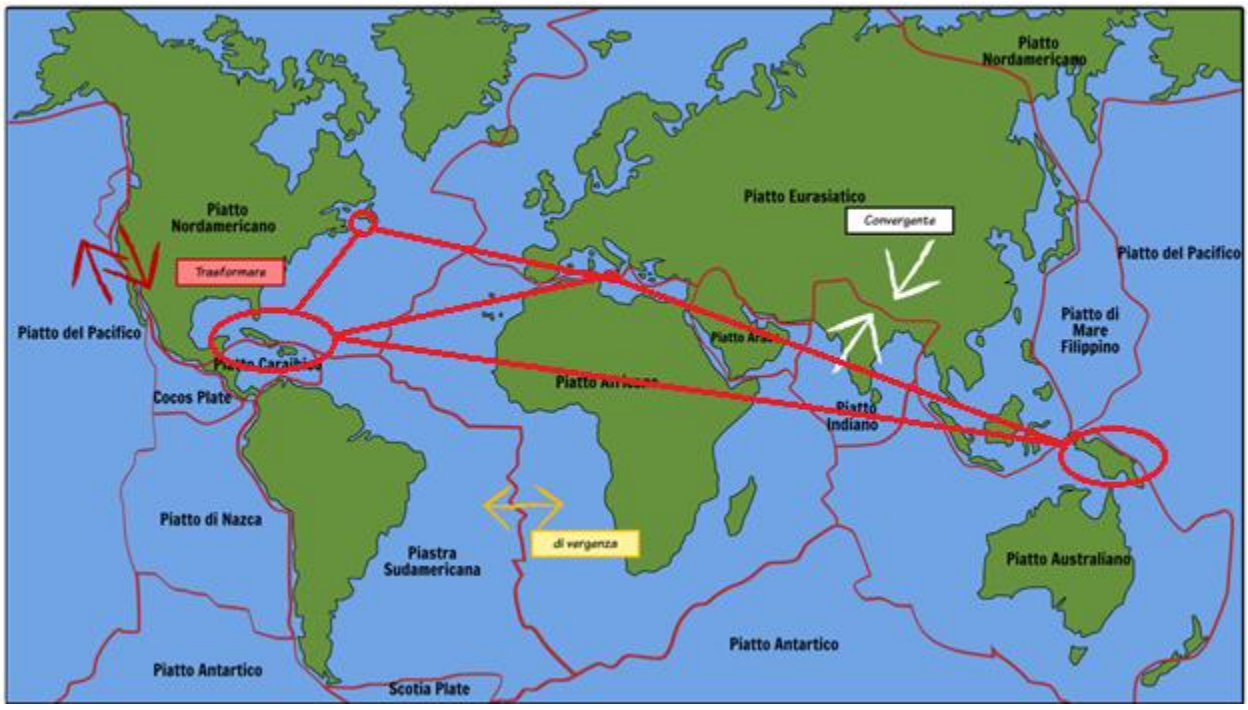
Gulf of Mexico/Antilles – Philippines – Guinea

Antilles – Strait of Gibraltar – Mouth of the Tagus (Spanish coasts) – French coasts

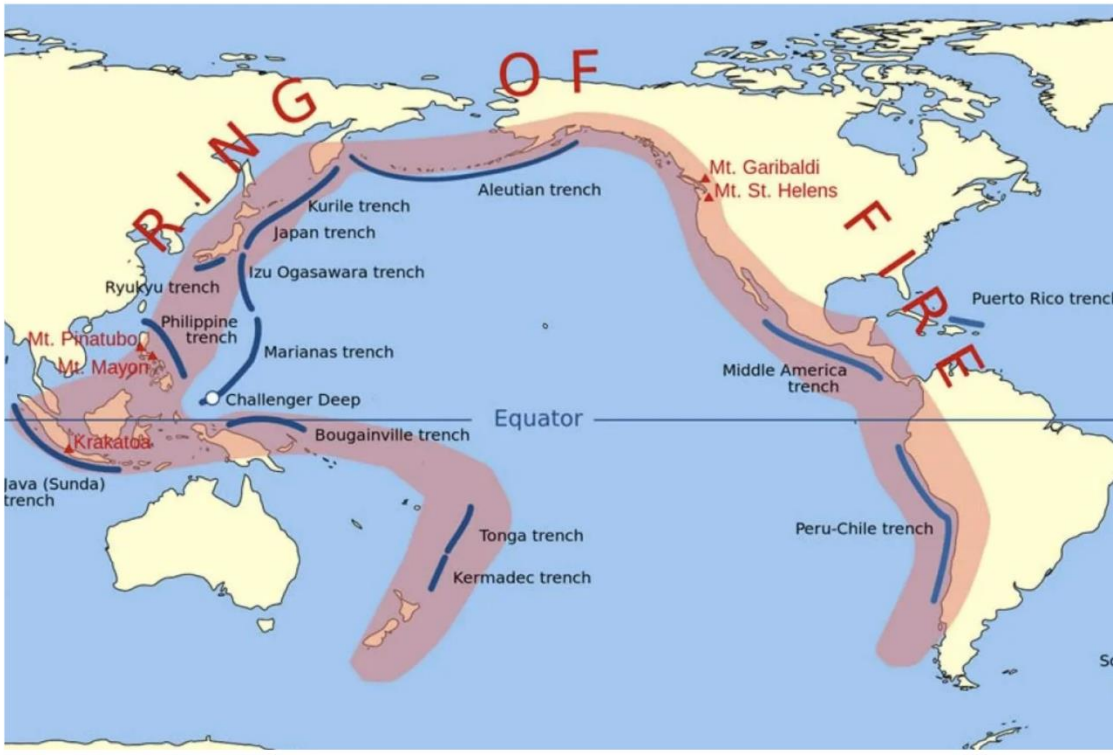


Summary 1 of all lines of greatest shaking: Antilles, Adriatic, Philippines (tides – earthquakes)

Summary 2. Possible connections and extensions between the lines of greatest shaking. It is clear that the main radiants are: Antilles/Gulf of Mexico-Bay of Fundy, Adriatic/Etna, Philippines-Guinea



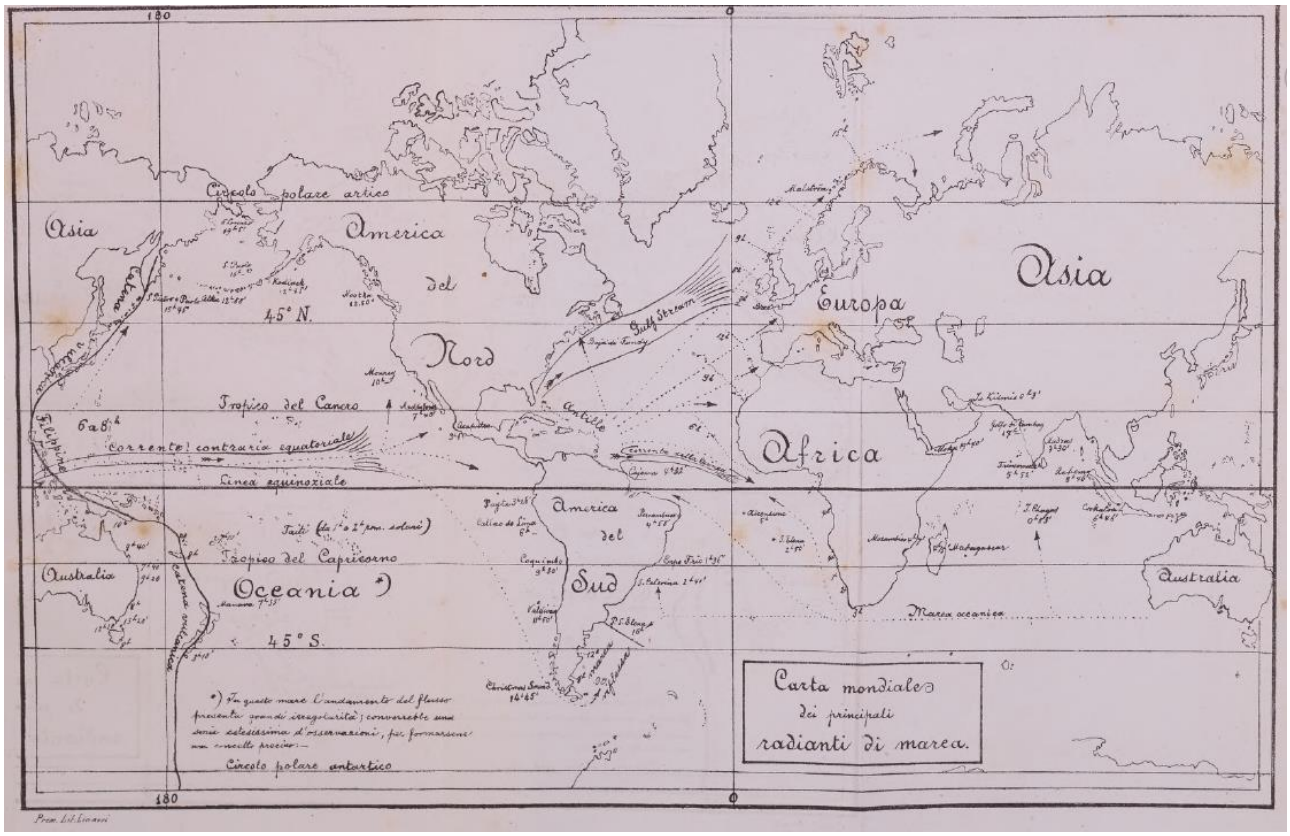
Continental plates



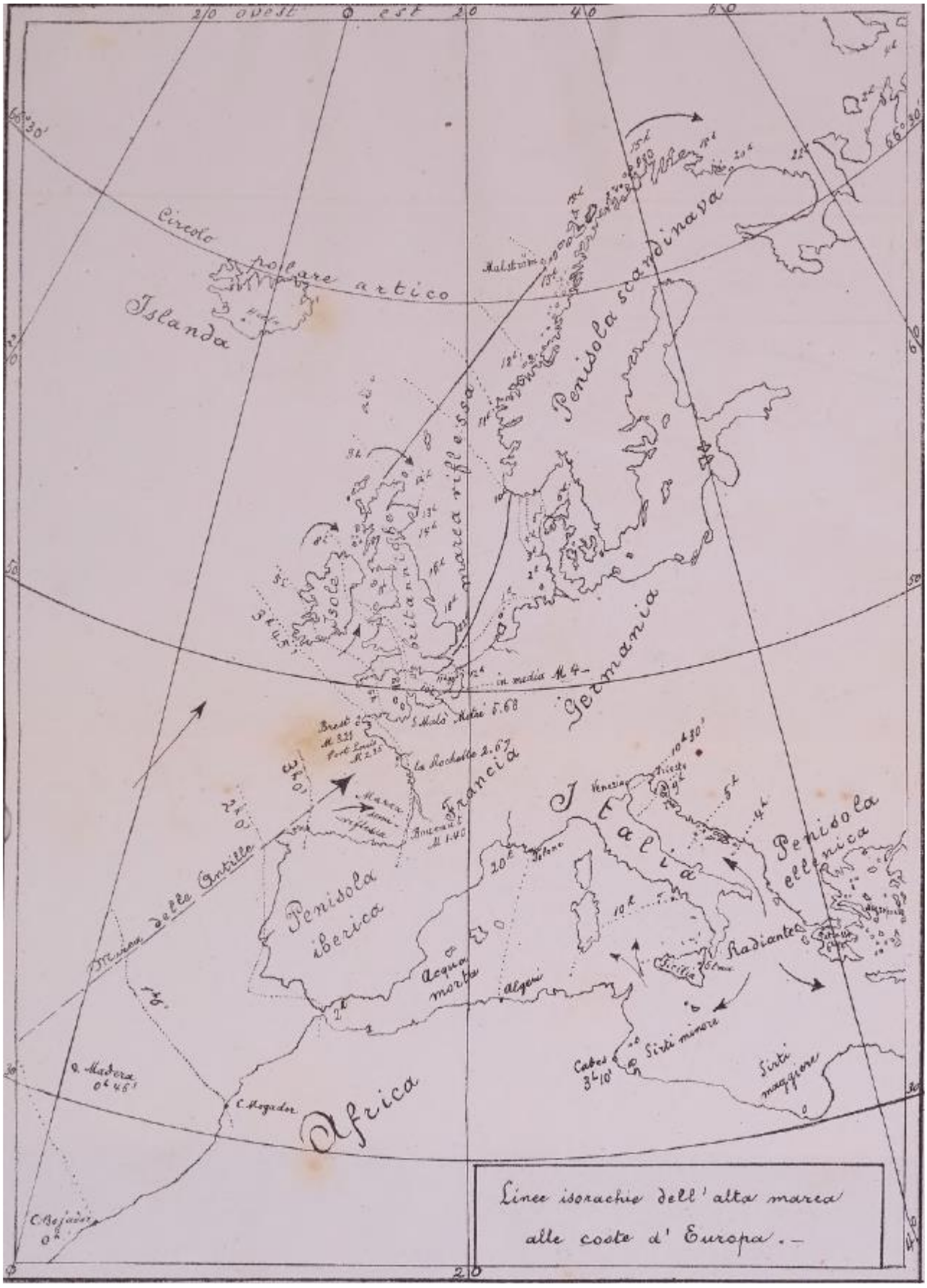
Ring of Fire

From Wikipedia:

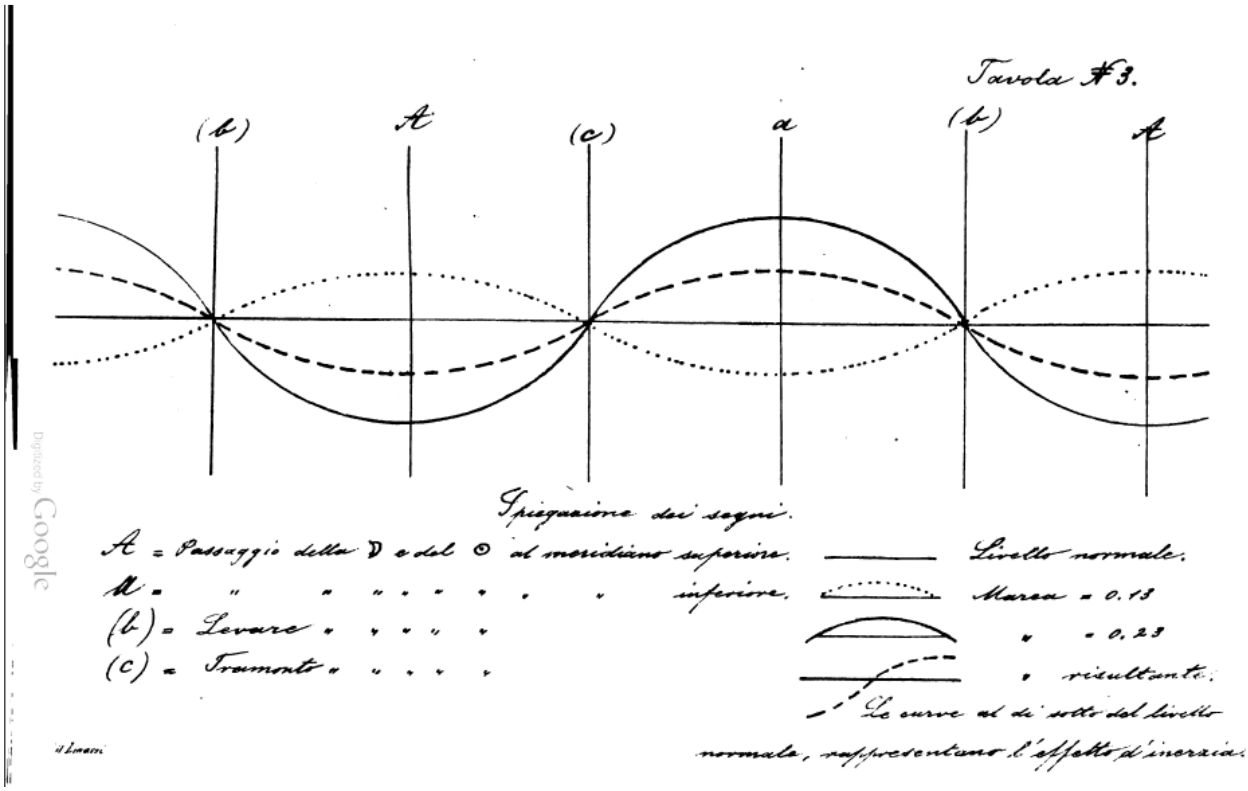
In geology, the name Pacific **Ring of Fire** indicates an area characterized by frequent earthquakes (it is estimated that 90% of the world's earthquakes occur within this belt: most of the deep earthquakes and many intermediate and superficial ones) and volcanic eruptions, extending for about 40,000 km (i.e. almost as long as the Earth's equatorial circumference) all around the Pacific Ocean. It is characterized by the presence of numerous island arcs (A volcanic arc is a chain of volcanic islands (or mountains) that are formed when a plate sinks and flows under another (subduction), creating a set of volcanoes more or less aligned along a curve: when an oceanic crust slides under another, there is an island arc; a continental arc occurs when an oceanic crust slides under a continental crust. In some cases a single subduction zone can show both aspects along the its margin.) (Polynesia, Philippines, New Zealand, Indonesia, Japan etc.), oceanic trenches (an oceanic trench is a linear depression of the ocean floor. It can be adjacent and parallel to a continental margin, or to an island arc, this The latter is separated from the continent and by a back-arc basin. They are generally thousands of meters long, up to 11,000 m deep and relatively very narrow.) and volcanic mountain ranges.



In this sea the flow pattern therefore presents irregularities. A very extensive series of observations would be needed to form a precise concept (Note by Giulio Grablovitz)


2/0 ovest
0 est 2/0
4/0
6/0
66°30'
Circolo polare artico
Islanda
Penisola scandinava
Mare del Nord
Germania
Francia
Penisola iberica
Italia
Penisola ellenica
Mare delle Antille
Acque morte
Africa
Linee isorachie dell' alta marea alle coste d' Europa.-

Isorachial lines of high tide on the coasts of Europe, i.e. isocotidal lines, which represent the lines of points on the sea surface with the same number of hours of tide delay.



Digitized by Google

Furthermore, we have that:

Ora passo all' esposizione degli elementi generali della marea pel porto di Venezia basati sulla seguente legge speciale per l' Adriatico:

"La marea adriatica si forma alla latitudine di 38° a 39°, in causa delle oscillazioni impresse al suolo dall' attrazione luni-solare presso all' imbocco del mare Adriatico.„

Questa parte flessibile della crosta terrestre che, secondo tutte le apparenze, ha sede negli arcipelaghi d' indole vulcanica della Sicilia e della Grecia, ha per centro assai probabilmente il monte Etna.

A tale supposizione mi trasse da bel principio la circostanza dell' insensibilità quasi assoluta delle maree nel Mediterraneo, mentre nell' Adriatico esse si rendono più sensibili quanto più s' avvicinano al fondo del golfo; la mia ipotesi si cangiò in certezza o poco meno, allorchè esaminando le ore dei singoli porti, scopersi che, supposta uniforme la velocità, il punto di partenza andava a porsi fra i gradi 38 e 39 di latitudine; conveniva osservare se anche le altezze delle maree, ossia le differenze fra due maree consecutive, corrispondessero a quella località; dopo un accurato e per molto tempo vano studio, una circostanza singolare ferì la mia attenzione, cioè che nei giorni in cui la luna passa per l' equatore le *discese* dall' alta alla bassa marea sono fra loro pressochè eguali, mentre le *salite* hanno valori diversi; esaminando allora le epoche delle massime declinazioni, osservai che le discese stavano nel rapporto di 1 a 5, il che s' avvicinava assai al rapporto che esiste fra i quadrati dei seni delle altezze relative alle massime declinazioni alla latitudine indicata; facendo un calcolo più rigoroso esse si riferivano al parallelo 36°, ma l' ipotesi del movimento del suolo, nei pressi di S. Maura e dell' Etna, località soggette a fenomeni vulcanici, tanto m' allettava, malgrado il senso di terrore che desta, che adottai la latitudine di 38° 30′ nella continuazione dei calcoli.

Rosarno (RC) is located at latitude 38° 30', from which we have highlighted two lines of maximum shaking that reach Venice/Trieste passing through Campania, Molise, the Molise-Puglia border, Abruzzo and the east of Marche.

Now, we observe that:

(38° 30') = arcseconds

Input interpretation

convert 38 degrees 30 arcminutes to arcseconds

Result

138 600" (arcseconds)

138600’’

Additional conversions

38.5° (degrees)

2^{h} 34^{m} (right ascension)

---

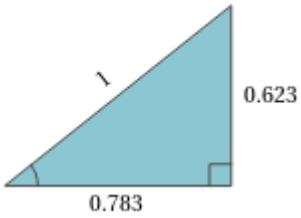
672 mrad (milliradians)

0.672 radians

42.78 grads
(unit officially deprecated)

Visual representation for 138600" (arcseconds)

Projections



Interpretation

plane angle

Basic unit dimensions

[angle]

Corresponding quantities

Rotation count N from $N = \varphi/(2\pi)$:

0.11 rot (rotations)

Slope percentage from [slope percentage] $= 100\% \times \tan(\theta)$:

79.54 slope% (slope percent)

From the result, after some calculations, we obtain:

144*1/((138600/1729)+π^2-(2√2)/π)

where (2√2)/π) is the so-called DN Constant (Del Gaudio-Nardelli Constant)

Input

$$144 \times \frac{1}{\frac{138\,600}{1729} + \pi^2 - \frac{2\sqrt{2}}{\pi}}$$

Result

$$\frac{144}{\frac{19\,800}{247} - \frac{2\sqrt{2}}{\pi} + \pi^2}$$

Decimal approximation

1.615595316371822399743817108349684931115975568519345331232451210 1

…

1.615595316371822…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Property

$$\frac{144}{\frac{19\,800}{247} - \frac{2\sqrt{2}}{\pi} + \pi^2}$$ is a transcendental number

Alternate forms

$$\frac{35\,568\,\pi}{19\,800\,\pi + 247\,\pi^3 - 494\sqrt{2}}$$

$$-\frac{35\,568\,\pi}{494\sqrt{2} - 19\,800\,\pi - 247\,\pi^3}$$

Series representations

$$\frac{144}{\frac{138\,600}{1729} + \pi^2 - \frac{2\sqrt{2}}{\pi}} = \frac{144}{\frac{19\,800}{247} + \pi^2 - \frac{2\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}}{\pi}}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{144}{\frac{138\,600}{1729}+\pi^2-\frac{2\sqrt{2}}{\pi}}=\frac{144}{\frac{19\,800}{247}+\pi^2-\frac{2\exp\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{\pi}}$$

for $(x\in\mathbb{R}$ and $x<0)$

$$\frac{144}{\frac{138\,600}{1729}+\pi^2-\frac{2\sqrt{2}}{\pi}}=$$

$$\frac{144}{\frac{19\,800}{247}+\pi^2-\frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{\pi}}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

i is the imaginary unit

And again:

(144+3)*1/((138600/1729)+π^2-(2√2)/π)-(29+11)/(π^2)(MRB const)^(1-1/(4π)+π)

Input

$$(144+3)\times\frac{1}{\frac{138\,600}{1729}+\pi^2-\frac{2\sqrt{2}}{\pi}}-\frac{29+11}{\pi^2}\,C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Exact result

$$\frac{147}{\frac{19\,800}{247}-\frac{2\sqrt{2}}{\pi}+\pi^2}-\frac{40\,C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}}{\pi^2}$$

Decimal approximation

1.64470303384776928454050462213278175310457861246760620366249774 29

…

1.644703033847769…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$\frac{36309\,\pi}{-494\,\sqrt{2}+19800\,\pi+247\,\pi^3}-\frac{40\,C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}}{\pi^2}$$

$$-\frac{40\left(-494\,\sqrt{2}+19800\,\pi+247\,\pi^3\right)C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}-36309\,\pi^3}{\pi^2\left(-494\,\sqrt{2}+19800\,\pi+247\,\pi^3\right)}$$

$$-\left(\left(C_{\text{MRB}}^{\,-1/(4\pi)}\left(19760\,\sqrt{2}\;C_{\text{MRB}}^{\,1+\pi}-792000\,\pi\,C_{\text{MRB}}^{\,1+\pi}+36309\,\pi^3\sqrt[4\pi]{C_{\text{MRB}}}-9880\,\pi^3\,C_{\text{MRB}}^{\,1+\pi}\right)\right)\Big/\left(\pi^2\left(494\,\sqrt{2}-19800\,\pi-247\,\pi^3\right)\right)\right)$$

Now, we have that:

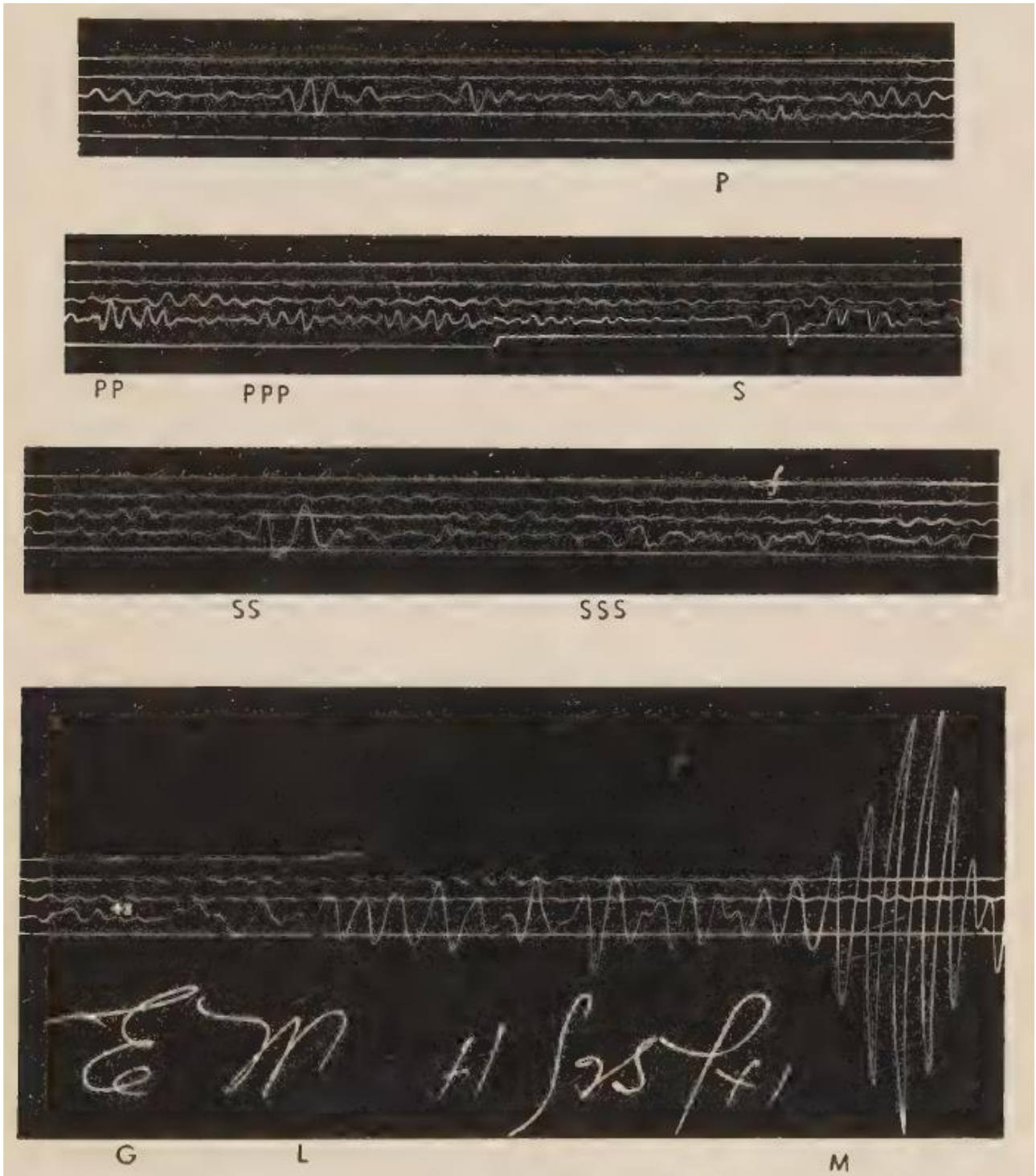


Fig. 6. Berkeley Seismogram (Bosch-Omori, East-West Component) of November 25, 1941, Epicentral Distance about 6,000 Miles.

21.09.1941 Solar eclipse 27.3°N 119.1°E 4:34:03

19 Novembre 1941	**LUNA NUOVA** alle 00:03		26°15′

25 Novembre 1941	**Primo quarto**	12:09	29°55′

(12h 09m)

Input interpretation

12 hours 9 minutes

Results

729 minutes

12.15 hours

Unit conversions

43 740 seconds

43740 seconds = 12.15°

(24h 03m)

Input interpretation

24 hours 3 minutes

Results

1443 minutes

24.05 hours

Unit conversions

1 day = 3 minutes

---

86 580 seconds

86580 seconds = 24.05°

(26° 15’) + (29° 55’) – (24.05° + 12.15°)

Input interpretation

26 degrees 15 arcminutes +
29 degrees 55 arcminutes – (24.05° (degrees) + 12.15° (degrees))

Results

19 degrees 58 arcminutes

19° 58’

(26° 15' + 12.15°)

Input interpretation

26 degrees 15 arcminutes + 12.15° (degrees)

Results

38 degrees 24 arcminutes

38° 24’

38° 24’ N 19° 58’ W (North Atlantic Ocean)

Azores earthquake of 25 November 1941

Latitudine	geografica	$\varphi_0 = 37^\circ\ 25',41$ N
»	geocentrica	$\varphi_0 = 37^\circ\ 14',23$ N
Longitudine		$\lambda_0 = 19^\circ\ 00',65$ W
Tempo origine		$t_0 = 18^h\ 03^m\ 54^s,7$

37° 25’ N 19° 00’ W (North Atlantic Ocean)

From

SEISMOLOGY *By Perry Byerly* – New York, 1942 - PRENTICE-HALL INC.

Now, we analyze the following equation concerning the pendulum:

$$T_0 = 2\pi \sqrt{\frac{K}{Mgh\left(\tan\alpha + \frac{MghA}{LP(L-A)^2}\right)}},$$

We consider:

2Pi*sqrt(K/(M*g*h*(tan(α) + (M*g*h*A)/(L*P*(L-A)^2))))

Input

$$2\pi \sqrt{\frac{K}{M\,g\,h\left(\tan(\alpha) + \frac{M\,g\,h\,A}{L\,P\,(L-A)^2}\right)}}$$

Alternate forms

$$2\pi \sqrt{\frac{K}{\frac{A\,g^2\,h^2\,M^2}{L\,P\,(L-A)^2} + g\,h\,M\tan(\alpha)}}$$

$$2\pi\sqrt{\frac{K}{g\,h\,M\left(\frac{A\,g\,h\,M}{L(-A+L)^2\,P}+\frac{\sin(\alpha)}{\cos(\alpha)}\right)}}$$

$$2\pi\sqrt{\frac{K\,L\,P\cos(\alpha)\,(A-L)^2}{g\,h\,M\left(P\sin(\alpha)\left(A^2\,L+L^3\right)+A\left(g\,h\,M\cos(\alpha)-2\,L^2\,P\sin(\alpha)\right)\right)}}$$

Alternate forms assuming A, g, h, K, L, M, P, and α are positive

$$\frac{2\pi\sqrt{\frac{K}{g\,h\,M}}\;(-1)^{\left\lfloor\left(\arg\left(\tan(\alpha)+\frac{A\,g\,h\,M}{L\,P\,(A-L)^2}\right)+\pi\right)\Big/(2\pi)\right\rfloor}}{\sqrt{\tan(\alpha)+\frac{A\,g\,h\,M}{L\,P\,(A-L)^2}}}$$

$$\frac{2\pi\sqrt{\frac{K}{g\,h\,M}}\;\exp\left(i\,\pi\left\lfloor\frac{\arg\left(\frac{A\,g\,h\,M}{L(L-A)^2\,P}+\tan(\alpha)\right)}{2\pi}+\frac{1}{2}\right\rfloor\right)}{\sqrt{\tan(\alpha)+\frac{A\,g\,h\,M}{L\,P\,(L-A)^2}}}$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

Derivative

$$\frac{\partial}{\partial A}\left(2\pi\sqrt{\frac{K}{M\,g\,h\left(\tan(\alpha)+\frac{M\,g\,h\,A}{L\,P\,(L-A)^2}\right)}}\right)=\frac{\pi\,K\,L\,P\,(A-L)\,(A+L)}{\left(A\,g\,h\,M+L\,P\tan(\alpha)\,(A-L)^2\right)^2\sqrt{\frac{K}{g\,h\,M\left(\tan(\alpha)+\frac{A\,g\,h\,M}{L\,P\,(L-A)^2}\right)}}}$$

Indefinite integral

$$\int 2\pi \sqrt{\frac{K}{M\,g\,h\left(\tan(\alpha)+\frac{M\,g\,h\,A}{L\,P\,(L-A)^2}\right)}}\,dA = \left(\pi \sqrt{\frac{K}{\frac{A\,g^2\,h^2\,M^2}{L\,P\,(L-A)^2}+g\,h\,M\tan(\alpha)}}\left(g\,h\,M\cos(\alpha)\sqrt{-A\,g\,h\,M\cos(\alpha)-L\,P\sin(\alpha)\,(A-L)^2}\,\tan^{-1}\left(\frac{2\,L\,P\sin(\alpha)\,(A-L)+g\,h\,M\cos(\alpha)}{2\sqrt{L}\,\sqrt{P}\,\sqrt{\sin(\alpha)}\,\sqrt{-A\,g\,h\,M\cos(\alpha)-L\,P\sin(\alpha)\,(A-L)^2}}\right)-2\sqrt{L}\,\sqrt{P}\,\sqrt{\sin(\alpha)}\,\left(A\,g\,h\,M\cos(\alpha)+L\,P\sin(\alpha)\,(A-L)^2\right)\right)\Big/\left(L^{3/2}\,P^{3/2}\sin^{3/2}(\alpha)\,(L-A)\right)+\text{constant}$$

$\tan^{-1}(x)$ is the inverse tangent function

From the alternate form:

$$2\pi\sqrt{\frac{K\,L\,P\cos(\alpha)\,(A-L)^2}{g\,h\,M\left(P\sin(\alpha)\left(A^2\,L+L^3\right)+A\left(g\,h\,M\cos(\alpha)-2\,L^2\,P\sin(\alpha)\right)\right)}}$$

we obtain:

2 π sqrt((K (A - L)^2 L P cos(α))/(g h M ((A^2 L + L^3) P sin(α) + A (g h M cos(α) - 2 L^2 P sin(α)))))

Input

$$2\pi\sqrt{\frac{K(A-L)^2\,L\,P\cos(\alpha)}{g\,h\,M\left(\left(A^2\,L+L^3\right)P\sin(\alpha)+A\left(g\,h\,M\cos(\alpha)-2\,L^2\,P\sin(\alpha)\right)\right)}}$$

$K(m)$ is the complete elliptic integral of the first kind with parameter $m = k^2$

Alternate forms

$$2\pi\sqrt{\frac{L\,P\cos(\alpha)\,K(A-L)^2}{g\,h\,M\left(A\,g\,h\,M\cos(\alpha)+L\,P\sin(\alpha)\,(A-L)^2\right)}}$$

$$2\pi\sqrt{\frac{L\,P\cos(\alpha)\,K(A-L)^2}{\sin(\alpha)\left(A^2\,g\,h\,L\,M\,P-2\,A\,g\,h\,L^2\,M\,P+g\,h\,L^3\,M\,P\right)+A\,g^2\,h^2\,M^2\cos(\alpha)}}$$

$$\sqrt{2}\,\pi\sqrt{\left(\frac{\left(e^{-i\,\alpha}+e^{i\,\alpha}\right)L\,P\,K(A-L)^2}{g\,h\,M\left(\frac{1}{2}\,i\left(e^{-i\,\alpha}-e^{i\,\alpha}\right)P\left(A^2\,L+L^3\right)+A\left(\frac{1}{2}\left(e^{-i\,\alpha}+e^{i\,\alpha}\right)g\,h\,M-i\left(e^{-i\,\alpha}-e^{i\,\alpha}\right)L^2\,P\right)\right)}\right)}$$

Alternate forms assuming A, g, h, L, M, P, and α are positive

$$\left(2\pi\sqrt{\cos(\alpha)}\;K(A-L)\sqrt{\frac{L\,P}{g\,h\,M}}\;(-1)^{\left\lfloor\left(-2\arg(K(A-L))+\arg\left(A\,g\,h\,M\cos(\alpha)+L\,P\sin(\alpha)\,(A-L)^2\right)-\arg(\cos(\alpha))+\pi\right)/(2\pi)\right\rfloor}\right)\Big/\left(\sqrt{A\,g\,h\,M\cos(\alpha)+L\,P\sin(\alpha)\,(A-L)^2}\right)$$

$$\left(2\pi\sqrt{\cos(\alpha)}\;K(A-L)\sqrt{\frac{L\,P}{g\,h\,M}}\;\exp\left(i\pi\left\lfloor-\frac{\arg(\cos(\alpha))}{2\pi}-\frac{\arg(K(A-L))}{\pi}+\frac{\arg\left(\left(L^3+A^2\,L\right)P\sin(\alpha)+A\left(g\,h\,M\cos(\alpha)-2\,L^2\,P\sin(\alpha)\right)\right)}{2\pi}+\frac{1}{2}\right\rfloor\right)\right)\Big/\left(\sqrt{P\sin(\alpha)\left(A^2\,L+L^3\right)+A\left(g\,h\,M\cos(\alpha)-2\,L^2\,P\sin(\alpha)\right)}\right)$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

Reduced trigonometric form

$$2\pi\sqrt{\frac{L\,P\cos(\alpha)\,K(A-L)^2}{h\,M\,g\left(P\,A^2\,L\sin(\alpha)+P\,L^3\sin(\alpha)+A\,g\,h\,M\cos(\alpha)+A\,(-2)\,L^2\,P\sin(\alpha)\right)}}$$

Derivative

$$\frac{\partial}{\partial A}\left(2\pi\sqrt{\frac{K(A-L)^2\,L\,P\cos(\alpha)}{g\,h\,M\left(\left(A^2\,L+L^3\right)P\sin(\alpha)+A\left(g\,h\,M\cos(\alpha)-2\,L^2\,P\sin(\alpha)\right)\right)}}\right)=$$
$$-\left(\left(\pi\,g\,h\,M\sec(\alpha)\left(\frac{L\,P\cos(\alpha)\,K(A-L)^2}{g\,h\,M\left(A\,g\,h\,M\cos(\alpha)+L\,P\sin(\alpha)\,(A-L)^2\right)}\right)^{3/2}\right.\right.$$
$$\left(((A-L)-1)\,K(A-L)\left(g\,h\,M\cos(\alpha)\,(2\,A-L)+3\,L\,P\sin(\alpha)\,(A-L)^2\right)+\right.$$
$$\left.\left.E(A-L)\left(A\,g\,h\,M\cos(\alpha)+L\,P\sin(\alpha)\,(A-L)^2\right)\right)\Big/$$
$$\left.\left(L\,P\,(L-A)\,(-A+L+1)\,K(A-L)^3\right)\right)$$

$\sec(x)$ is the secant function

$E(m)$ is the complete elliptic integral of the second kind with parameter $m = k^2$

From the reduced trigonometric form

$$2\pi\sqrt{\frac{L\,P\cos(\alpha)\,K(A-L)^2}{h\,M\,g\left(P\,A^2\,L\sin(\alpha)+P\,L^3\sin(\alpha)+A\,g\,h\,M\cos(\alpha)+A\,(-2)\,L^2\,P\sin(\alpha)\right)}}$$

we obtain:

2 π sqrt((L P cos(α) EllipticK(A - L)^2)/(h M g (P A^2 L sin(α) + P L^3 sin(α) + A g h M cos(α) + A (-2) L^2 P sin(α))))

Input

$$2\pi\sqrt{\frac{L\,P\cos(\alpha)\,K(A-L)^2}{h\,M\,g\left(P\,A^2\,L\sin(\alpha)+P\,L^3\sin(\alpha)+A\,g\,h\,M\cos(\alpha)+A\times(-2)\,L^2\,P\sin(\alpha)\right)}}$$

$K(m)$ is the complete elliptic integral of the first kind with parameter $m = k^2$

Exact result

$$2\pi\sqrt{\frac{L\,P\cos(\alpha)\,K(A-L)^2}{g\,h\,M\left(A^2\,L\,P\sin(\alpha)+A\,g\,h\,M\cos(\alpha)-2\,A\,L^2\,P\sin(\alpha)+L^3\,P\sin(\alpha)\right)}}$$

Alternate forms

$$2\pi\sqrt{\frac{L\,P\cos(\alpha)\,K(A-L)^2}{g\,h\,M\left(A\,g\,h\,M\cos(\alpha)+L\,P\sin(\alpha)\,(A-L)^2\right)}}$$

$$2\pi\sqrt{\frac{L\,P\cos(\alpha)\,K(A-L)^2}{\sin(\alpha)\left(A^2\,g\,h\,L\,M\,P-2\,A\,g\,h\,L^2\,M\,P+g\,h\,L^3\,M\,P\right)+A\,g^2\,h^2\,M^2\cos(\alpha)}}$$

$$\sqrt{2}\,\pi\sqrt{\left(\left(\left(e^{-i\alpha}+e^{i\alpha}\right)L\,P\,K(A-L)^2\right)\Big/\left(g\,h\,M\left(\frac{1}{2}\,i\left(e^{-i\alpha}-e^{i\alpha}\right)A^2\,L\,P+\frac{1}{2}\left(e^{-i\alpha}+e^{i\alpha}\right)A\,g\,h\,M-i\left(e^{-i\alpha}-e^{i\alpha}\right)A\,L^2\,P+\frac{1}{2}\,i\left(e^{-i\alpha}-e^{i\alpha}\right)L^3\,P\right)\right)\right)}$$

Alternate forms assuming A, g, h, L, M, P, and α are positive

$$\left(2\pi\sqrt{\cos(\alpha)}\ K(A-L)\sqrt{\frac{L\,P}{g\,h\,M}}\right.$$
$$\left.(-1)^{\left\lfloor\left(-2\arg(K(A-L))+\arg\left(A\,g\,h\,M\cos(\alpha)+L\,P\sin(\alpha)\,(A-L)^2\right)-\arg(\cos(\alpha))+\pi\right)/(2\pi)\right\rfloor}\right)\Big/$$
$$\left(\sqrt{A\,g\,h\,M\cos(\alpha)+L\,P\sin(\alpha)\,(A-L)^2}\right)$$

$$\left(2\pi\sqrt{\cos(\alpha)}\ K(A-L)\sqrt{\frac{L\,P}{g\,h\,M}}\ \exp\left(i\,\pi\left\lfloor-\frac{\arg(\cos(\alpha))}{2\pi}-\frac{\arg(K(A-L))}{\pi}+\right.\right.\right.$$
$$\left.\left.\left.\frac{\arg\left(P\sin(\alpha)\,L^3-2\,A\,P\sin(\alpha)\,L^2+A^2\,P\sin(\alpha)\,L+A\,g\,h\,M\cos(\alpha)\right)}{2\pi}+\right.\right.\right.$$
$$\left.\left.\left.\frac{1}{2}\right\rfloor\right)\right)\Big/$$
$$\left(\sqrt{A^2\,L\,P\sin(\alpha)+A\,g\,h\,M\cos(\alpha)-2\,A\,L^2\,P\sin(\alpha)+L^3\,P\sin(\alpha)}\right)$$

arg(z) is the complex argument

$\lfloor x \rfloor$ is the floor function

Derivative

$$\frac{\partial}{\partial A}\left(2\pi\sqrt{\left(\left(L\,P\cos(\alpha)\,K(A-L)^2\right)/\left(h\,M\,g\left(P\,A^2\,L\sin(\alpha)+P\,L^3\sin(\alpha)+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.A\,g\,h\,M\cos(\alpha)+A\times(-2)\,L^2\,P\sin(\alpha)\right)\right)\right)\right)=$$
$$-\left(\left(\left(\pi\,g\,h\,M\sec(\alpha)\left(\frac{L\,P\cos(\alpha)\,K(A-L)^2}{g\,h\,M\left(A\,g\,h\,M\cos(\alpha)+L\,P\sin(\alpha)\,(A-L)^2\right)}\right)^{3/2}\right.\right.\right.$$
$$\left.\left.\left.\left(((A-L)-1)\,K(A-L)\left(g\,h\,M\cos(\alpha)\,(2\,A-L)+3\,L\,P\sin(\alpha)\,(A-L)^2\right)+\right.\right.\right.$$
$$\left.\left.\left.E(A-L)\left(A\,g\,h\,M\cos(\alpha)+L\,P\sin(\alpha)\,(A-L)^2\right)\right)\right)\Big/$$
$$\left.\left.\left(L\,P\,(L-A)\,(-A+L+1)\,K(A-L)^3\right)\right)\right)$$

sec(x) is the secant function

$E(m)$ is the complete elliptic integral of the second kind with parameter $m = k^2$

From the exact result

$$2\pi\sqrt{\frac{L\,P\cos(\alpha)\,K(A-L)^2}{g\,h\,M\left(A^2\,L\,P\sin(\alpha)+A\,g\,h\,M\cos(\alpha)-2\,A\,L^2\,P\sin(\alpha)+L^3\,P\sin(\alpha)\right)}}$$

2 π sqrt((L P cos(α) EllipticK(A - L)^2)/(g h M (A g h M cos(α) + A^2 L P sin(α) - 2 A L^2 P sin(α) + L^3 P sin(α))))

for $\alpha = ((2\sqrt{2})/\pi)$, $g = 2$, $h = 4$, $A = 8$, $L = 16$, $M = 32$ and $P = 64$:

2 π sqrt((16*64 cos(((2√2)/π)) EllipticK(8 - 16)^2)/(2*4*32 (8*2*4*32 cos(((2√2)/π)) + 8^2*16*64 sin(((2√2)/π)) – 2*8*16^2*64 sin(((2√2)/π)) + 16^3*64 sin(((2√2)/π)))))

Input

$$2\pi\sqrt{\left(\left((16\times64)\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\Big/\left(2\times4\times32\left(8\times2\times4\times32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times16\times64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-\left(2\times8\times16^2\times64\right)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)}$$

$K(m)$ is the complete elliptic integral of the first kind with parameter $m = k^2$

Exact result

$$4\pi\,K(-8)\sqrt{\frac{\cos\left(\frac{2\sqrt{2}}{\pi}\right)}{65\,536\sin\left(\frac{2\sqrt{2}}{\pi}\right)+2048\cos\left(\frac{2\sqrt{2}}{\pi}\right)}}$$

Decimal approximation

0.036396844125961276489725853139167990118278564761604549485403 4007

…

0.03639684412….

Alternate forms

$$\frac{\pi K(-8)\cos\left(\frac{2\sqrt{2}}{\pi}\right)}{8\sqrt{1+32\sin\left(\frac{4\sqrt{2}}{\pi}\right)+\cos\left(\frac{4\sqrt{2}}{\pi}\right)}}$$

$$\frac{1}{8}\pi K(-8)\sqrt{\frac{\cos\left(\frac{2\sqrt{2}}{\pi}\right)}{2\left(32\sin\left(\frac{2\sqrt{2}}{\pi}\right)+\cos\left(\frac{2\sqrt{2}}{\pi}\right)\right)}}$$

$$2\sqrt{\frac{2\left(e^{-(2i\sqrt{2})/\pi}+e^{(2i\sqrt{2})/\pi}\right)}{32\,768\,i\left(e^{-(2i\sqrt{2})/\pi}-e^{(2i\sqrt{2})/\pi}\right)+1024\left(e^{-(2i\sqrt{2})/\pi}+e^{(2i\sqrt{2})/\pi}\right)}}\,\pi K(-8)$$

Alternative representations

$$2\pi\sqrt{\left(\left((16\times 64)\left(\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\right)\Big/\left(2\times 4\times 32\left(8\times 2\times 4\times 32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times 16\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-(2\times 8\times 16^2\times 64)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)}=$$

$$2\pi\sqrt{\left(\left(1024\cosh\left(-\frac{2i\sqrt{2}}{\pi}\right)F\left(\frac{\pi}{2}\,\middle|\,-8\right)^2\right)\Big/\left(256\left(2048\cosh\left(-\frac{2i\sqrt{2}}{\pi}\right)+1024\cos\left(\frac{\pi}{2}-\frac{2\sqrt{2}}{\pi}\right)8^2-1024\cos\left(\frac{\pi}{2}-\frac{2\sqrt{2}}{\pi}\right)16^2+64\cos\left(\frac{\pi}{2}-\frac{2\sqrt{2}}{\pi}\right)16^3\right)\right)\right)}$$

$$2\pi\sqrt{\left(\left((16\times 64)\left(\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\right)\Big/\left(2\times 4\times 32\left(8\times 2\times 4\times 32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times 16\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-\left(2\times 8\times 16^2\times 64\right)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)}=$$

$$2\pi\sqrt{\left(\left(512\left(e^{-(2i\sqrt{2})/\pi}+e^{(2i\sqrt{2})/\pi}\right)\mathrm{sn}^{-1}(1\mid -8)^2\right)\Big/\left(256\left(1024\cos\left(\frac{\pi}{2}-\frac{2\sqrt{2}}{\pi}\right)8^2-1024\cos\left(\frac{\pi}{2}-\frac{2\sqrt{2}}{\pi}\right)16^2+64\cos\left(\frac{\pi}{2}-\frac{2\sqrt{2}}{\pi}\right)16^3+1024\left(e^{-(2i\sqrt{2})/\pi}+e^{(2i\sqrt{2})/\pi}\right)\right)\right)\right)}$$

$$2\pi\sqrt{\left(\left((16\times 64)\left(\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\right)\Big/\left(2\times 4\times 32\left(8\times 2\times 4\times 32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times 16\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-\left(2\times 8\times 16^2\times 64\right)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)}=$$

$$2\pi\sqrt{\left(\left(512\left(e^{-(2i\sqrt{2})/\pi}+e^{(2i\sqrt{2})/\pi}\right)F\left(\frac{\pi}{2}\,\middle|\,-8\right)^2\right)\Big/\left(256\left(1024\cos\left(\frac{\pi}{2}-\frac{2\sqrt{2}}{\pi}\right)8^2-1024\cos\left(\frac{\pi}{2}-\frac{2\sqrt{2}}{\pi}\right)16^2+64\cos\left(\frac{\pi}{2}-\frac{2\sqrt{2}}{\pi}\right)16^3+1024\left(e^{-(2i\sqrt{2})/\pi}+e^{(2i\sqrt{2})/\pi}\right)\right)\right)\right)}$$

$\cosh(x)$ is the hyperbolic cosine function

$F(x \mid m)$ is the elliptic integral of the first kind with parameter $m = k^2$

$\mathrm{sn}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function sn

i is the imaginary unit

Series representations

$$2\pi \sqrt{\left(\left((16\times 64)\left(\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\right)\Big/ \left(2\times 4\times 32\left(8\times 2\times 4\times 32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times 16\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-\left(2\times 8\times 16^2\times 64\right)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)} = \frac{\pi^2\sqrt{\frac{\sum_{k=0}^{\infty}\frac{(-8)^k\,\pi^{-2k}}{(2k)!}}{\sum_{k=0}^{\infty}\pi^{-2k}\left(\frac{(-8)^k}{(2k)!}+\frac{(-1)^k\,2^{13/2+3k}}{\pi\,(1+2k)!}\right)}}\;\sum_{k=0}^{\infty}\frac{2\tilde{F}_1\left(\frac{1}{2},\frac{1}{2};1-k;z_0\right)(-8-z_0)^k\,z_0^{-k}}{k!}}{16\sqrt{2}}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } 1 \le z_0 < \infty))$

$$2\pi \sqrt{\left(\left((16\times 64)\left(\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\right)\Big/ \left(2\times 4\times 32\left(8\times 2\times 4\times 32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times 16\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-\left(2\times 8\times 16^2\times 64\right)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)} = \frac{1}{16\sqrt{2}}\pi^2\sqrt{-\frac{\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{2\sqrt{2}}{\pi}-\frac{\pi}{2}\right)^{1+2k}}{(1+2k)!}}{\sum_{k=0}^{\infty}\left(\frac{(-1)^{1+k}\left(\frac{2\sqrt{2}}{\pi}-\frac{\pi}{2}\right)^{1+2k}}{(1+2k)!}+\frac{(-1)^k\,2^{13/2+3k}\,\pi^{-1-2k}}{(1+2k)!}\right)}}\;\sum_{k=0}^{\infty}\frac{2\tilde{F}_1\left(\frac{1}{2},\frac{1}{2};1-k;z_0\right)(-8-z_0)^k\,z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } 1 \le z_0 < \infty))$

$$2\pi\sqrt{\left(\left((16\times 64)\left(\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\right)\Big/\left(2\times 4\times 32\left(8\times 2\times 4\times 32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times 16\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-\left(2\times 8\times 16^2\times 64\right)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)}=\frac{\pi^2\sqrt{\frac{\sum_{k=0}^{\infty}\frac{(-8)^k\pi^{-2k}}{(2k)!}}{\sum_{k=0}^{\infty}\frac{(-8)^k\pi^{-2k}}{(2k)!}+32\sqrt{\frac{2}{\pi}}\sum_{j=0}^{\infty}\operatorname{Res}_{s=-j}\frac{2^{-s}\pi^{2s}\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}}}\sum_{k=0}^{\infty}\frac{2\tilde{F}_1\left(\frac{1}{2},\frac{1}{2};1-k;z_0\right)(-8-z_0)^k z_0^{-k}}{k!}}{16\sqrt{2}}$$

for $(\text{not } (z_0\in\mathbb{R} \text{ and } 1\le z_0<\infty))$

$n!$ is the factorial function

${}_2\tilde{F}_1(a,b;c;x)$ is the regularized hypergeometric function

$\mathbb{R}$ is the set of real numbers

$\Gamma(x)$ is the gamma function

$\operatorname{Res}_{z=z_0} f$ is a complex residue

Integral representations

$$2\pi\sqrt{\left(\left((16\times 64)\left(\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\right)\Big/\left(2\times 4\times 32\left(8\times 2\times 4\times 32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times 16\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-\left(2\times 8\times 16^2\times 64\right)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)}=\frac{1}{8}\pi^{3/2}\sqrt{\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-2/(\pi^2 s)+s}}{\sqrt{s}}\,ds}{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{2e^{-2/(\pi^2 s)+s}(32\sqrt{2}+\pi s)}{s^{3/2}}\,ds}}\int_1^{\infty}\frac{1}{\sqrt{-1+t^2}\sqrt{8+t^2}}\,dt$$

for

$\gamma>0$

$$2\pi\sqrt{\left(\left((16\times 64)\left(\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\right)\Big/\left(2\times 4\times 32\left(8\times 2\times 4\times 32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times 16\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-\left(2\times 8\times 16^2\times 64\right)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)}=\frac{1}{8}\pi^{3/2}\sqrt{\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-2/(\pi^2 s)+s}}{\sqrt{s}}\,ds}{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{2e^{-2/(\pi^2 s)+s}\left(32\sqrt{2}+\pi s\right)}{s^{3/2}}\,ds}}\int_0^1\frac{1}{\sqrt{1-t^2}\,\sqrt{1+8t^2}}\,dt$$

for

$\gamma > 0$

$$2\pi\sqrt{\left(\left((16\times 64)\left(\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\right)\Big/\left(2\times 4\times 32\left(8\times 2\times 4\times 32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times 16\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-\left(2\times 8\times 16^2\times 64\right)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)}=\frac{1}{8}\pi\left(\int_1^\infty\frac{1}{\sqrt{-1+t^2}\,\sqrt{8+t^2}}\,dt\right)\sqrt{\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-2/(\pi^2 s)+s}}{\sqrt{s}}\,ds}{\int_{-i\infty+\gamma}^{i\infty+\gamma}\left(\frac{2e^{-2/(\pi^2 s)+s}}{\sqrt{s}}+\frac{2^{13/2-s}\pi^{-1+2s}\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\right)ds}}$$

for

$0 < \gamma < 1$

Multiple-argument formulas

$$2\pi\sqrt{\left(\left((16\times 64)\left(\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\right)\Big/\left(2\times 4\times 32\left(8\times 2\times 4\times 32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times 16\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-\left(2\times 8\times 16^2\times 64\right)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)}=\frac{\pi K(-8)}{8\sqrt{2+64\tan\left(\frac{2\sqrt{2}}{\pi}\right)}}$$

$$2\pi\sqrt{\left(\left((16\times 64)\left(\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\right)\Big/\left(2\times 4\times 32\left(8\times 2\times 4\times 32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times 16\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-\left(2\times 8\times 16^2\times 64\right)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)}=\frac{1}{8}\pi K(-8)\sqrt{\frac{\cos\left(\frac{2\sqrt{2}}{\pi}\right)}{2\left(\cos\left(\frac{2\sqrt{2}}{\pi}\right)+32\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)}}$$

$$2\pi\sqrt{\left(\left((16\times 64)\left(\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\right)\Big/\left(2\times 4\times 32\left(8\times 2\times 4\times 32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times 16\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-\left(2\times 8\times 16^2\times 64\right)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)}=4\pi K(-8)\sqrt{\frac{-1+2\cos^2\left(\frac{\sqrt{2}}{\pi}\right)}{2048\left(-1+2\cos^2\left(\frac{\sqrt{2}}{\pi}\right)\right)+131\,072\cos\left(\frac{\sqrt{2}}{\pi}\right)\sin\left(\frac{\sqrt{2}}{\pi}\right)}}$$

From which, we obtain:

64/((2 π sqrt((16*64 cos(((2√2)/π)) EllipticK(8 - 16)^2)/(2*4*32 (8*2*4*32 cos(((2√2)/π)) + 8^2*16*64 sin(((2√2)/π)) – 2*8*16^2*64 sin(((2√2)/π)) + 16^3*64 sin(((2√2)/π)))))))-29-2MRB const

Input

$$64 \Big/ \left(2\pi \sqrt{\left(\left((16\times 64)\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\Big/ \left(2\times 4\times 32\left(8\times 2\times 4\times 32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+ 8^2\times 16\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-\left(2\times 8\times 16^2\times 64\right)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+ 16^3\times 64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)}\right) - 29 - 2C_{\text{MRB}}$$

$K(m)$ is the complete elliptic integral of the first kind with parameter $m = k^2$

C_{MRB} is the MRB constant

Exact result

$$\frac{16\sqrt{\sec\left(\frac{2\sqrt{2}}{\pi}\right)\left(65\,536\sin\left(\frac{2\sqrt{2}}{\pi}\right)+2048\cos\left(\frac{2\sqrt{2}}{\pi}\right)\right)}}{\pi\,K(-8)} - 2C_{\text{MRB}} - 29$$

$\sec(x)$ is the secant function

Decimal approximation

1729.018491446929996960319572913755092562571325225163011342601616 3

…

1729.0184914469….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number).

Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternate forms

$$\frac{512\sqrt{2+64\tan\left(\frac{2\sqrt{2}}{\pi}\right)}}{\pi K(-8)}-2C_{\text{MRB}}-29$$

$$\frac{512\sqrt{2\left(1+32\tan\left(\frac{2\sqrt{2}}{\pi}\right)\right)}-29\pi K(-8)}{\pi K(-8)}-2C_{\text{MRB}}$$

$$-\frac{2\pi K(-8)C_{\text{MRB}}+29\pi K(-8)-512\sqrt{2\left(1+32\tan\left(\frac{2\sqrt{2}}{\pi}\right)\right)}}{\pi K(-8)}$$

(1/27((64/((2 π sqrt((16*64 cos(((2√2)/π)) EllipticK(8 - 16)^2)/(2*4*32 (8*2*4*32 cos(((2√2)/π)) + 8^2*16*64 sin(((2√2)/π))–2*8*16^2*64 sin(((2√2)/π))+16^3*64 sin(((2√2)/π)))))))-29-2MRB const)-1))^2

Input

$$\left(\frac{1}{27}\left(\left(64\Big/\left(2\pi\sqrt{\left(\left((16\times64)\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2\right)\Big/\left(2\times4\times32\left(8\times2\times4\times32\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times16\times64\sin\left(\frac{2\sqrt{2}}{\pi}\right)-(2\times8\times16^2\times64)\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)\right)\right)-29-2C_{\text{MRB}}\right)-1\right)\right)^2$$

$K(m)$ is the complete elliptic integral of the first kind with parameter $m = k^2$

C_{MRB} is the MRB constant

Exact result

$$\frac{1}{729}\left(\frac{16\sqrt{\sec\left(\frac{2\sqrt{2}}{\pi}\right)\left(65\,536\sin\left(\frac{2\sqrt{2}}{\pi}\right)+2048\cos\left(\frac{2\sqrt{2}}{\pi}\right)\right)}}{\pi\,K(-8)}-2\,C_{\text{MRB}}-30\right)^2$$

$\sec(x)$ is the secant function

Decimal approximation

4096.087663624861013799394310989484717519102708971343061843177491 4

…

4096.087663624861…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternate forms

$$\frac{4\left(\pi\,K(-8)\,(C_{\text{MRB}}+15)-256\sqrt{2+64\tan\left(\frac{2\sqrt{2}}{\pi}\right)}\right)^2}{729\,\pi^2\,K(-8)^2}$$

$$\frac{4\left(-\pi\,K(-8)\,C_{\text{MRB}}-15\,\pi\,K(-8)+256\sqrt{2\left(1+32\tan\left(\frac{2\sqrt{2}}{\pi}\right)\right)}\right)^2}{729\,\pi^2\,K(-8)^2}$$

$$\frac{4\left(-\pi\,K(-8)\,C_{\text{MRB}}-15\,\pi\,K(-8)+256\sqrt{2\sec\left(\frac{2\sqrt{2}}{\pi}\right)\left(32\sin\left(\frac{2\sqrt{2}}{\pi}\right)+\cos\left(\frac{2\sqrt{2}}{\pi}\right)\right)}\right)^2}{729\,\pi^2\,K(-8)^2}$$

Expanded forms

$$-\frac{64\sqrt{2048+65\,536\tan\left(\frac{2\sqrt{2}}{\pi}\right)}\,C_{\text{MRB}}}{729\,\pi\,K(-8)}+\frac{524\,288}{729\,\pi^2\,K(-8)^2}+\frac{16\,777\,216\tan\left(\frac{2\sqrt{2}}{\pi}\right)}{729\,\pi^2\,K(-8)^2}-\frac{320\sqrt{2048+65\,536\tan\left(\frac{2\sqrt{2}}{\pi}\right)}}{243\,\pi\,K(-8)}+\frac{40\,C_{\text{MRB}}}{243}+\frac{4\,{C_{\text{MRB}}}^2}{729}+\frac{100}{81}$$

$$-\frac{64\sqrt{\sec\left(\frac{2\sqrt{2}}{\pi}\right)\left(65\,536\sin\left(\frac{2\sqrt{2}}{\pi}\right)+2048\cos\left(\frac{2\sqrt{2}}{\pi}\right)\right)}\,C_{\text{MRB}}}{729\,\pi\,K(-8)}+\frac{524\,288}{729\,\pi^2\,K(-8)^2}+\frac{16\,777\,216\tan\left(\frac{2\sqrt{2}}{\pi}\right)}{729\,\pi^2\,K(-8)^2}-\frac{320\sqrt{\sec\left(\frac{2\sqrt{2}}{\pi}\right)\left(65\,536\sin\left(\frac{2\sqrt{2}}{\pi}\right)+2048\cos\left(\frac{2\sqrt{2}}{\pi}\right)\right)}}{243\,\pi\,K(-8)}+\frac{40\,C_{\text{MRB}}}{243}+\frac{4\,{C_{\text{MRB}}}^2}{729}+\frac{100}{81}$$

((64/((2π√((1024 cos(((2√2)/π)) EllipticK(8 - 16)^2)/(256 (8*256 cos(((2√2)/π))+8^2*1024sin(((2√2)/π))–1024*256sin(((2√2)/π))+16^3*64 sin(((2√2)/π)))))))-29-2MRB const))^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\left(\frac{64}{2\pi\sqrt{\frac{1024\cos\left(\frac{2\sqrt{2}}{\pi}\right)K(8-16)^2}{256\left(8\times256\cos\left(\frac{2\sqrt{2}}{\pi}\right)+8^2\times1024\sin\left(\frac{2\sqrt{2}}{\pi}\right)-1024\times256\sin\left(\frac{2\sqrt{2}}{\pi}\right)+16^3\times64\sin\left(\frac{2\sqrt{2}}{\pi}\right)\right)}}}-29-2C_{\text{MRB}}\right)\wedge(1/15)+C_{\text{MRB}}^{1-1/(4\pi)+\pi}$$

$K(m)$ is the complete elliptic integral of the first kind with parameter $m = k^2$

C_{MRB} is the MRB constant

Exact result

$$\sqrt[15]{\frac{16\sqrt{\sec\left(\frac{2\sqrt{2}}{\pi}\right)\left(65\,536\sin\left(\frac{2\sqrt{2}}{\pi}\right)+2048\cos\left(\frac{2\sqrt{2}}{\pi}\right)\right)}}{\pi K(-8)}-2C_{\text{MRB}}-29+C_{\text{MRB}}^{1-1/(4\pi)+\pi}}$$

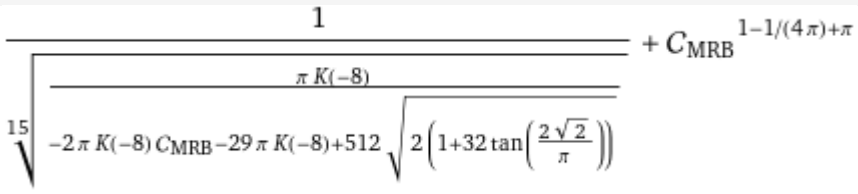
$\sec(x)$ is the secant function

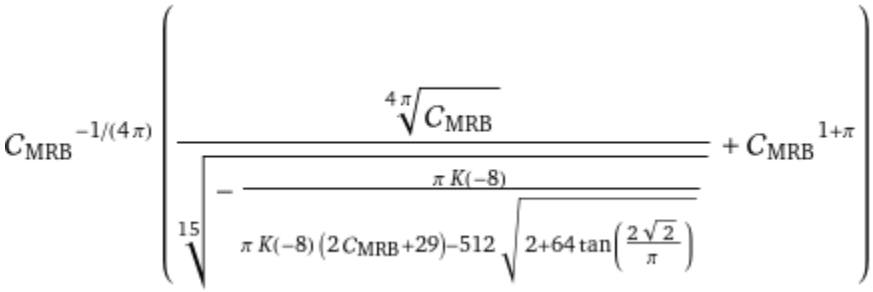
Decimal approximation

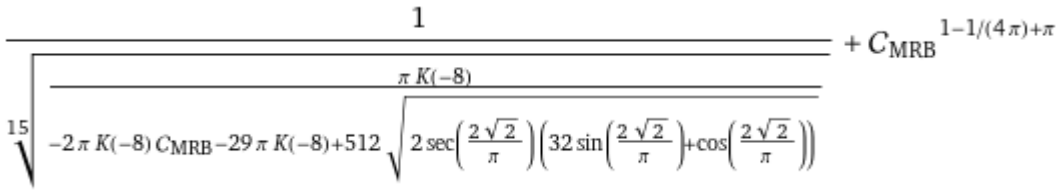
1.64493919615148095734162101557701466373668255059767336855506879 57…

1.6449391961…. ≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms







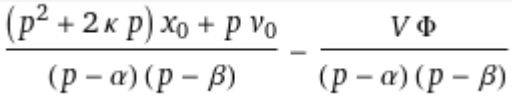
Now, we analyze the following equation:

$$x = \frac{(p^2 + 2\kappa p)x_0 + pv_0}{(p-\alpha)(p-\beta)} - \frac{V\Phi}{(p-\alpha)(p-\beta)}.$$

We consider:

((p^2 + 2*κ*p)*(x_0)+p*(v_0))/((p-α)(p-β)) – (V*Φ)/((p-α)(p-β))

Input



Φ is the golden ratio conjugate

Exact form

$$\frac{p\,v_0 + p\,x_0\,(2\kappa + p) + V\,(-\phi) + V}{(p-\alpha)\,(p-\beta)}$$

ϕ is the golden ratio

Alternate forms

$$\frac{p^2\,x_0 + p\,(v_0 + 2\kappa\,x_0) - V\,\Phi}{(p-\alpha)\,(p-\beta)}$$

$$-\frac{p^2\,(-x_0) - p\,v_0 - 2\kappa\,p\,x_0 + V\,\Phi}{(p-\alpha)\,(p-\beta)}$$

Expanded form

$$\frac{p^2\,x_0}{(p-\alpha)\,(p-\beta)} - \frac{V\,\Phi}{(p-\alpha)\,(p-\beta)} + \frac{p\,v_0}{(p-\alpha)\,(p-\beta)} + \frac{2\kappa\,p\,x_0}{(p-\alpha)\,(p-\beta)}$$

Roots

$$p = 0, \quad V = 0, \quad \alpha\,\beta \neq 0$$

$$p\,(2\kappa + p) \neq 0, \quad x_0 = \frac{V\,\Phi - p\,v_0}{p\,(2\kappa + p)}, \quad \alpha\,\beta + p^2 - \alpha\,p - \beta\,p \neq 0$$

$$p \neq 0, \quad \kappa = -\frac{p}{2}, \quad v_0 = \frac{V\,\Phi}{p}, \quad \alpha\,\beta + p^2 - \alpha\,p - \beta\,p \neq 0$$

Root for the variable v_0

$$v_0 = \frac{p^2 (-x_0) - 2\kappa\, p\, x_0 + V\,\Phi}{p}$$

Derivative

$$\frac{\partial}{\partial x_0}\left(\frac{\left(p^2 + 2\kappa\, p\right) x_0 + p\, v_0}{(p-\alpha)(p-\beta)} - \frac{V\,\Phi}{(p-\alpha)(p-\beta)}\right) = \frac{p\,(2\kappa + p)}{(p-\alpha)(p-\beta)}$$

Indefinite integral

$$\int\left(\frac{\left(p^2 + 2\kappa\, p\right) x_0 + p\, v_0}{(p-\alpha)(p-\beta)} - \frac{V\,\Phi}{(p-\alpha)(p-\beta)}\right) dx_0 = \frac{p\, v_0\, x_0 + \frac{1}{2}\, p\, x_0^2\,(2\kappa + p) - V\, x_0\,\Phi}{(p-\alpha)(p-\beta)} + \text{constant}$$

Limit

$$\lim_{p\to\pm\infty}\left(-\frac{\Phi\, V}{(p-\alpha)(p-\beta)} + \frac{p\, v_0 + \left(p^2 + 2\, p\,\kappa\right) x_0}{(p-\alpha)(p-\beta)}\right) = x_0$$

From the indefinite integral result

$$\int\left(\frac{\left(p^2 + 2\kappa\, p\right) x_0 + p\, v_0}{(p-\alpha)(p-\beta)} - \frac{V\,\Phi}{(p-\alpha)(p-\beta)}\right) dx_0 = \frac{p\, v_0\, x_0 + \frac{1}{2}\, p\, x_0^2\,(2\kappa + p) - V\, x_0\,\Phi}{(p-\alpha)(p-\beta)} + \text{constant}$$

we obtain:

(p v_0 x_0 + 1/2 p x_0^2 (2 κ + p) - V x_0 Φ)/((p - α) (p - β))

Input

$$\frac{p\,v_0\,x_0 + \frac{1}{2}\,p\,x_0^2\,(2\,\kappa + p) - V\,x_0\,\Phi}{(p-\alpha)\,(p-\beta)}$$

Φ is the golden ratio conjugate

Exact form

$$\frac{x_0\,(2\,p\,v_0 + p\,x_0\,(2\,\kappa + p) - 2\,V\,(\phi - 1))}{2\,(p-\alpha)\,(p-\beta)}$$

ϕ is the golden ratio

Expanded forms

$$\frac{p^2\,x_0^2}{2\,(p-\alpha)\,(p-\beta)} - \frac{V\,x_0\,\Phi}{(p-\alpha)\,(p-\beta)} + \frac{p\,v_0\,x_0}{(p-\alpha)\,(p-\beta)} + \frac{\kappa\,p\,x_0^2}{(p-\alpha)\,(p-\beta)}$$

$$\frac{p^2\,x_0^2 + 2\,p\,v_0\,x_0 + 2\,\kappa\,p\,x_0^2 - 2\,V\,x_0\,\Phi}{2\,\alpha\,\beta + 2\,p^2 - 2\,\alpha\,p - 2\,\beta\,p}$$

Alternate forms

$$\frac{x_0\left(p^2\,x_0 + 2\,p\,v_0 + 2\,\kappa\,p\,x_0 - 2\,V\,\Phi\right)}{2\,(p-\alpha)\,(p-\beta)}$$

$$\frac{p\left(p\,x_0^2 + 2\,v_0\,x_0 + 2\,\kappa\,x_0^2\right) - 2\,V\,x_0\,\Phi}{2\,\alpha\,\beta + p\,(-2\,\alpha - 2\,\beta + 2\,p)}$$

$$\frac{x_0\,(p\,v_0 - V\,\Phi)}{(p-\alpha)\,(p-\beta)} + \frac{p\,x_0^2\,(2\,\kappa + p)}{2\,(p-\alpha)\,(p-\beta)}$$

Roots

$$x_0 = 0\,,\quad \alpha\,\beta + p^2 - \alpha\,p - \beta\,p \neq 0$$

$$p = 0, \quad V = 0, \quad \alpha\,\beta \neq 0$$

$$p\,(2\,\kappa + p) \neq 0, \quad x_0 = -\frac{2\,(p\,v_0 - V\,\Phi)}{p\,(2\,\kappa + p)}, \quad \alpha\,\beta + p^2 - \alpha\,p - \beta\,p \neq 0$$

$$p \neq 0, \quad \kappa = -\frac{p}{2}, \quad v_0 = \frac{V\,\Phi}{p}, \quad \alpha\,\beta + p^2 - \alpha\,p - \beta\,p \neq 0$$

Root for the variable v_0

$$v_0 = \frac{p^2\,(-x_0) - 2\,\kappa\,p\,x_0 + 2\,V\,\Phi}{2\,p}$$

Derivative

$$\frac{\partial}{\partial x_0}\left(\frac{p\,v_0\,x_0 + \frac{1}{2}\,p\,x_0^2\,(2\,\kappa + p) - V\,x_0\,\Phi}{(p-\alpha)\,(p-\beta)}\right) = \frac{p\,v_0 + p\,x_0\,(2\,\kappa + p) + V\,(-\Phi)}{(p-\alpha)\,(p-\beta)}$$

Indefinite integral

$$\int \frac{p\,v_0\,x_0 + \frac{1}{2}\,p\,x_0^2\,(2\,\kappa + p) - V\,x_0\,\Phi}{(p-\alpha)\,(p-\beta)}\,dx_0 = \frac{x_0^2\,(p\,v_0 - V\,\Phi) + \frac{1}{3}\,p\,x_0^3\,(2\,\kappa + p)}{2\,(p-\alpha)\,(p-\beta)} + \text{constant}$$

Limit

$$\lim_{p\to\pm\infty} \frac{-\Phi\,V\,x_0 + p\,v_0\,x_0 + \frac{1}{2}\,p\,(p + 2\,\kappa)\,x_0^2}{(p-\alpha)\,(p-\beta)} = \frac{x_0^2}{2} \approx 0.5\,x_0^2$$

Again, from the indefinite integral result

$$\int \frac{p\,v_0\,x_0 + \frac{1}{2}\,p\,x_0^2\,(2\kappa + p) - V\,x_0\,\Phi}{(p-\alpha)\,(p-\beta)}\,dx_0 = \frac{x_0^2\,(p\,v_0 - V\,\Phi) + \frac{1}{3}\,p\,x_0^3\,(2\kappa + p)}{2\,(p-\alpha)\,(p-\beta)} + \text{constant}$$

we obtain:

(x_0^2 (p v_0 - V Φ) + 1/3 p x_0^3 (2 κ + p))/(2 (p - α) (p - β))

Input

$$\frac{x_0^2\,(p\,v_0 - V\,\Phi) + \frac{1}{3}\,p\,x_0^3\,(2\kappa + p)}{2\,(p-\alpha)\,(p-\beta)}$$

Φ is the golden ratio conjugate

Exact form

$$\frac{x_0^2\,(3\,p\,v_0 + p\,x_0\,(2\kappa + p) - 3\,V\,(\phi - 1))}{6\,(p-\alpha)\,(p-\beta)}$$

ϕ is the golden ratio

Alternate forms

$$\frac{x_0^2\left(p^2\,x_0 + p\,(3\,v_0 + 2\kappa\,x_0) - 3\,V\,\Phi\right)}{6\,(p-\alpha)\,(p-\beta)}$$

$$\frac{x_0^3\left(p^2 + 2\kappa\,p\right) + 3\,p\,v_0\,x_0^2 - 3\,V\,x_0^2\,\Phi}{6\,p^2 + \alpha\,(6\,\beta - 6\,p) - 6\,\beta\,p}$$

$$\frac{p\left(p\,x_0^3 + 3\,v_0\,x_0^2 + 2\kappa\,x_0^3\right) - 3\,V\,x_0^2\,\Phi}{6\,\alpha\,\beta + p\,(-6\,\alpha - 6\,\beta + 6\,p)}$$

Expanded forms

$$\frac{p^2 x_0^3}{6(p-\alpha)(p-\beta)} - \frac{V x_0^2 \Phi}{2(p-\alpha)(p-\beta)} + \frac{p v_0 x_0^2}{2(p-\alpha)(p-\beta)} + \frac{\kappa p x_0^3}{3(p-\alpha)(p-\beta)}$$

$$\frac{p^2 x_0^3 + 3 p v_0 x_0^2 + 2\kappa p x_0^3 - 3 V x_0^2 \Phi}{6\alpha\beta + 6p^2 - 6\alpha p - 6\beta p}$$

Roots

$$x_0 = 0, \quad \alpha\beta + p^2 - \alpha p - \beta p \neq 0$$

$$p = 0, \quad V = 0, \quad \alpha\beta \neq 0$$

$$p(2\kappa + p) \neq 0, \quad x_0 = -\frac{3(p v_0 - V\Phi)}{p(2\kappa + p)}, \quad \alpha\beta + p^2 - \alpha p - \beta p \neq 0$$

$$p \neq 0, \quad \kappa = -\frac{p}{2}, \quad v_0 = \frac{V\Phi}{p}, \quad \alpha\beta + p^2 - \alpha p - \beta p \neq 0$$

Root for the variable v_0

$$v_0 = \frac{p^2(-x_0) - 2\kappa p x_0 + 3V\Phi}{3p}$$

Derivative

$$\frac{\partial}{\partial x_0}\left(\frac{x_0^2(p v_0 - V\Phi) + \frac{1}{3} p x_0^3 (2\kappa + p)}{2(p-\alpha)(p-\beta)}\right) = \frac{x_0(2 p v_0 + p x_0 (2\kappa + p) - 2V\Phi)}{2(p-\alpha)(p-\beta)}$$

Indefinite integral

$$\int \frac{x_0^2\,(p\,v_0 - V\,\Phi) + \frac{1}{3}\,p\,x_0^3\,(2\,\kappa + p)}{2\,(p-\alpha)\,(p-\beta)}\,dx_0 = \frac{x_0^3\,(p\,v_0 - V\,\Phi) + \frac{1}{4}\,p\,x_0^4\,(2\,\kappa + p)}{6\,(p-\alpha)\,(p-\beta)} + \text{constant}$$

Limit

$$\lim_{p\to\pm\infty} \frac{(-\Phi\,V + p\,v_0)\,x_0^2 + \frac{1}{3}\,p\,(p+2\,\kappa)\,x_0^3}{2\,(p-\alpha)\,(p-\beta)} = \frac{x_0^3}{6} \approx 0.166667\,x_0^3$$

From the indefinite integral result

$$\int \frac{x_0^2\,(p\,v_0 - V\,\Phi) + \frac{1}{3}\,p\,x_0^3\,(2\,\kappa + p)}{2\,(p-\alpha)\,(p-\beta)}\,dx_0 = \frac{x_0^3\,(p\,v_0 - V\,\Phi) + \frac{1}{4}\,p\,x_0^4\,(2\,\kappa + p)}{6\,(p-\alpha)\,(p-\beta)} + \text{constant}$$

we obtain:

(x_0^3 (p v_0 - V Φ) + 1/4 p x_0^4 (2 κ + p))/(6 (p - α) (p - β))

Input

$$\frac{x_0^3\,(p\,v_0 - V\,\Phi) + \frac{1}{4}\,p\,x_0^4\,(2\,\kappa + p)}{6\,(p-\alpha)\,(p-\beta)}$$

Φ is the golden ratio conjugate

Exact form

$$\frac{x_0^3\,(4\,p\,v_0 + p\,x_0\,(2\,\kappa + p) - 4\,V\,(\phi - 1))}{24\,(p-\alpha)\,(p-\beta)}$$

ϕ is the golden ratio

Alternate forms

$$\frac{x_0^3\left(p^2 x_0 + 2p(2v_0 + \kappa x_0) - 4V\Phi\right)}{24(p-\alpha)(p-\beta)}$$

$$\frac{p\left(p x_0^4 + 4 v_0 x_0^3 + 2\kappa x_0^4\right) - 4V x_0^3 \Phi}{24\alpha\beta + p(-24\alpha - 24\beta + 24p)}$$

$$\frac{x_0^3(p v_0 - V\Phi)}{6(p-\alpha)(p-\beta)} + \frac{p x_0^4(2\kappa + p)}{24(p-\alpha)(p-\beta)}$$

Expanded forms

$$\frac{p^2 x_0^4}{24(p-\alpha)(p-\beta)} - \frac{V x_0^3 \Phi}{6(p-\alpha)(p-\beta)} + \frac{p v_0 x_0^3}{6(p-\alpha)(p-\beta)} + \frac{\kappa p x_0^4}{12(p-\alpha)(p-\beta)}$$

$$\frac{p^2 x_0^4 + 4 p v_0 x_0^3 + 2\kappa p x_0^4 - 4V x_0^3 \Phi}{24\alpha\beta + 24p^2 - 24\alpha p - 24\beta p}$$

Roots

$x_0 = 0, \quad \alpha\beta + p^2 - \alpha p - \beta p \neq 0$

$p = 0, \quad V = 0, \quad \alpha\beta \neq 0$

$p(2\kappa + p) \neq 0, \quad x_0 = -\frac{4(p v_0 - V\Phi)}{p(2\kappa + p)}, \quad \alpha\beta + p^2 - \alpha p - \beta p \neq 0$

$$p \neq 0\,, \quad \kappa = -\frac{p}{2}\,, \quad v_0 = \frac{V\,\Phi}{p}\,, \quad \alpha\,\beta + p^2 - \alpha\,p - \beta\,p \neq 0$$

Root for the variable v_0

$$v_0 = \frac{p^2\,(-x_0) - 2\,\kappa\,p\,x_0 + 4\,V\,\Phi}{4\,p}$$

Derivative

$$\frac{\partial}{\partial x_0}\left(\frac{x_0^3\,(p\,v_0 - V\,\Phi) + \frac{1}{4}\,p\,x_0^4\,(2\,\kappa + p)}{6\,(p-\alpha)\,(p-\beta)}\right) = \frac{x_0^2\,(3\,p\,v_0 + p\,x_0\,(2\,\kappa + p) - 3\,V\,\Phi)}{6\,(p-\alpha)\,(p-\beta)}$$

Indefinite integral

$$\int \frac{x_0^3\,(p\,v_0 - V\,\Phi) + \frac{1}{4}\,p\,x_0^4\,(2\,\kappa + p)}{6\,(p-\alpha)\,(p-\beta)}\,dx_0 = \frac{x_0^4\,(p\,v_0 - V\,\Phi) + \frac{1}{5}\,p\,x_0^5\,(2\,\kappa + p)}{24\,(p-\alpha)\,(p-\beta)} + \text{constant}$$

Limit

$$\lim_{p\to\pm\infty} \frac{(-\Phi\,V + p\,v_0)\,x_0^3 + \frac{1}{4}\,p\,(p + 2\,\kappa)\,x_0^4}{6\,(p-\alpha)\,(p-\beta)} = \frac{x_0^4}{24} \approx 0.0416667\,x_0^4$$

From the indefinite integral result

$$\int \frac{x_0^3 (p\, v_0 - V\, \Phi) + \frac{1}{4}\, p\, x_0^4 (2\kappa + p)}{6 (p - \alpha) (p - \beta)}\, dx_0 = \frac{x_0^4 (p\, v_0 - V\, \Phi) + \frac{1}{5}\, p\, x_0^5 (2\kappa + p)}{24 (p - \alpha) (p - \beta)} + \text{constant}$$

(x_0^4 (p v_0 - V Φ) + 1/5 p x_0^5 (2 κ + p))/(24 (p - α) (p - β))

for $x_0 = 2$, $\alpha = 4$, $\beta = 8$, $\kappa = ((2\sqrt{2})/\pi)$ = DN Constant, $p = 16$, $v_0 = 32$, $V = 64$:

(2^4 (16*32 – 64*Φ) + 1/5*16*2^5 (2(((2√2)/π)) + 16))/(24 (16 - 4) (16 - 8))

Input

$$\frac{2^4 (16 \times 32 - 64\, \Phi) + \frac{1}{5} \times 16 \times 2^5 \left(2 \times \frac{2\sqrt{2}}{\pi} + 16\right)}{24 (16 - 4) (16 - 8)}$$

Φ is the golden ratio conjugate

Result

$$\frac{16 (512 - 64\, \Phi) + \frac{512}{5} \left(16 + \frac{4\sqrt{2}}{\pi}\right)}{2304}$$

Exact form

$$\frac{2}{45} \left(101 - 5\sqrt{5} + \frac{4\sqrt{2}}{\pi}\right)$$

Decimal approximation

4.072013010880678384758423557260315555027824733415680561323928387 3

…

4.07201301088….

Property

$$\frac{16\,(512 - 64\,\Phi) + \frac{512}{5}\left(16 + \frac{4\sqrt{2}}{\pi}\right)}{2304}$$ is a transcendental number

Alternate forms

$$\frac{4\left(-5\,\pi\,\Phi + 2\sqrt{2} + 48\,\pi\right)}{45\,\pi}$$

$$\frac{4}{45}\left(-5\,\Phi + 48 + \frac{2\sqrt{2}}{\pi}\right)$$

$$\frac{8\sqrt{2}}{45\,\pi} - \frac{4}{45}\,(5\,\Phi - 48)$$

Expanded form

$$-\frac{4\,\Phi}{9} + \frac{64}{15} + \frac{8\sqrt{2}}{45\,\pi}$$

From which, after some calculations, we obtain:

((2^4 (16*32 – 64*Φ) + 1/5*16*2^5 (2(((2√2)/π)) + 16))/(24 (16 - 4) (16 - 8)))^6 - 322 - 123 - 18 + 4/5MRB const

Input

$$\left(\frac{2^4\,(16\times 32 - 64\,\Phi) + \frac{1}{5}\times 16\times 2^5\left(2\times\frac{2\sqrt{2}}{\pi} + 16\right)}{24\,(16-4)\,(16-8)}\right)^6 - 322 - 123 - 18 + \frac{4}{5}\,C_{\text{MRB}}$$

Φ is the golden ratio conjugate

C_{MRB} is the MRB constant

Exact result

$$\frac{4\,C_{MRB}}{5} + \frac{\left(16\,(512 - 64\,\Phi) + \frac{512}{5}\left(16 + \frac{4\sqrt{2}}{\pi}\right)\right)^6}{149\,587\,343\,098\,087\,735\,296} - 463$$

Decimal approximation

4095.996499208366869154092951413570324715521216111715455006477561 2

…

4095.9964992…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternate forms

$$\frac{4\,C_{\text{MRB}}}{5}+\frac{4096\left(\pi\,(48-5\,\Phi)+2\,\sqrt{2}\right)^6}{8\,303\,765\,625\,\pi^6}-463$$

$$\frac{1}{8\,303\,765\,625\,\pi^6}\left(6\,643\,012\,500\,\pi^6\,C_{\text{MRB}}+64\,000\,000\,\pi^6\,\Phi^6-153\,600\,000\,\pi^5\left(\sqrt{2}+24\,\pi\right)\Phi^5+153\,600\,000\,\pi^4\left(\sqrt{2}+24\,\pi\right)^2\Phi^4-81\,920\,000\,\pi^3\left(\sqrt{2}+24\,\pi\right)^3\Phi^3+24\,576\,000\,\pi^2\left(\sqrt{2}+24\,\pi\right)^4\Phi^2-3\,932\,160\,\pi\left(\sqrt{2}+24\,\pi\right)^5\Phi+2\,097\,152+150\,994\,944\,\sqrt{2}\,\pi+9\,059\,696\,640\,\pi^2+144\,955\,146\,240\,\sqrt{2}\,\pi^3+2\,609\,192\,632\,320\,\pi^4+12\,524\,124\,635\,136\,\sqrt{2}\,\pi^5+46\,251\,855\,056\,169\,\pi^6\right)$$

$$\frac{1}{8\,303\,765\,625\,\pi^6}\left(6\,643\,012\,500\,\pi^6\,C_{\text{MRB}}-1\,887\,436\,800\,\pi^2\,\Phi+98\,304\,000\,\pi^2\,\Phi^2-1\,087\,163\,596\,800\,\pi^4\,\Phi+169\,869\,312\,000\,\pi^4\,\Phi^2-11\,796\,480\,000\,\pi^4\,\Phi^3+307\,200\,000\,\pi^4\,\Phi^4-31\,310\,311\,587\,840\,\pi^6\,\Phi+8\,153\,726\,976\,000\,\pi^6\,\Phi^2-1\,132\,462\,080\,000\,\pi^6\,\Phi^3+88\,473\,600\,000\,\pi^6\,\Phi^4-3\,686\,400\,000\,\pi^6\,\Phi^5+64\,000\,000\,\pi^6\,\Phi^6+2\,097\,152+9\,059\,696\,640\,\pi^2+2\,609\,192\,632\,320\,\pi^4+46\,251\,855\,056\,169\,\pi^6\right)-\frac{1}{8\,303\,765\,625\,\pi^5}16\,384\,\sqrt{2}\left(960\,\Phi+2\,764\,800\,\pi^2\,\Phi-288\,000\,\pi^2\,\Phi^2+10\,000\,\pi^2\,\Phi^3+398\,131\,200\,\pi^4\,\Phi-82\,944\,000\,\pi^4\,\Phi^2+8\,640\,000\,\pi^4\,\Phi^3-450\,000\,\pi^4\,\Phi^4+9375\,\pi^4\,\Phi^5-9216-8\,847\,360\,\pi^2-764\,411\,904\,\pi^4\right)$$

Expanded form

$$\frac{4\,C_{\text{MRB}}}{5}-\frac{8\,589\,934\,592\,\Phi}{2\,278\,125}+\frac{268\,435\,456\,\Phi^2}{273\,375}-\frac{67\,108\,864\,\Phi^3}{492\,075}+\frac{1\,048\,576\,\Phi^4}{98\,415}-\frac{131\,072\,\Phi^5}{295\,245}+\frac{4096\,\Phi^6}{531\,441}-\frac{1\,048\,576\,\sqrt{2}\,\Phi}{553\,584\,375\,\pi^5}-\frac{8\,388\,608\,\Phi}{36\,905\,625\,\pi^4}+\frac{262\,144\,\Phi^2}{22\,143\,375\,\pi^4}-\frac{67\,108\,864\,\sqrt{2}\,\Phi}{12\,301\,875\,\pi^3}+\frac{4\,194\,304\,\sqrt{2}\,\Phi^2}{7\,381\,125\,\pi^3}-\frac{262\,144\,\sqrt{2}\,\Phi^3}{13\,286\,025\,\pi^3}-\frac{536\,870\,912\,\Phi}{4\,100\,625\,\pi^2}+\frac{16\,777\,216\,\Phi^2}{820\,125\,\pi^2}-\frac{2\,097\,152\,\Phi^3}{1\,476\,225\,\pi^2}+\frac{32\,768\,\Phi^4}{885\,735\,\pi^2}-\frac{1\,073\,741\,824\,\sqrt{2}\,\Phi}{1\,366\,875\,\pi}+\frac{134\,217\,728\,\sqrt{2}\,\Phi^2}{820\,125\,\pi}-\frac{8\,388\,608\,\sqrt{2}\,\Phi^3}{492\,075\,\pi}+\frac{262\,144\,\sqrt{2}\,\Phi^4}{295\,245\,\pi}-\frac{16\,384\,\sqrt{2}\,\Phi^5}{885\,735\,\pi}+\frac{63\,445\,617\,361}{11\,390\,625}+\frac{2\,097\,152}{8\,303\,765\,625\,\pi^6}+\frac{16\,777\,216\,\sqrt{2}}{922\,640\,625\,\pi^5}+\frac{67\,108\,864}{61\,509\,375\,\pi^4}+\frac{1\,073\,741\,824\,\sqrt{2}}{61\,509\,375\,\pi^3}+\frac{2\,147\,483\,648}{6\,834\,375\,\pi^2}+\frac{17\,179\,869\,184\,\sqrt{2}}{11\,390\,625\,\pi}$$

27*sqrt(((2^4 (16*32 – 64*Φ) + 1/5*16*2^5 (2(((2√2)/π)) + 16))/(24 (16 - 4) (16 - 8)))^6 - 322 - 123 - 18 + 4/5MRB const)+1

Input

$$27\sqrt{\left(\left(\frac{2^4\,(16\times 32-64\,\Phi)+\frac{1}{5}\times 16\times 2^5\left(2\times\frac{2\sqrt{2}}{\pi}+16\right)}{24\,(16-4)\,(16-8)}\right)^6-322-123-18+\frac{4}{5}\,C_{\text{MRB}}\right)}+1$$

Φ is the golden ratio conjugate

C_{MRB} is the MRB constant

Exact result

$$27\sqrt{\frac{4\,C_{\text{MRB}}}{5}+\frac{\left(16\,(512-64\,\Phi)+\frac{512}{5}\left(16+\frac{4\sqrt{2}}{\pi}\right)\right)^6}{149\,587\,343\,098\,087\,735\,296}-463}+1$$

Decimal approximation

1728.99926155160710115288161791008063214417765457135869094915490 84

…

1728.9992615516….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2.

Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternate forms

$$27\sqrt{\frac{4\,C_{\text{MRB}}}{5}+\frac{4096\left(\pi\,(48-5\,\Phi)+2\sqrt{2}\right)^6}{8\,303\,765\,625\,\pi^6}-463}\;+1$$

$$27\sqrt{\frac{4\,C_{\text{MRB}}}{5}+\frac{\left(-1024\,\Phi+8192+\frac{512}{5}\left(16+\frac{4\sqrt{2}}{\pi}\right)\right)^6}{149\,587\,343\,098\,087\,735\,296}-463}\;+1$$

$$\frac{1}{3375\,\pi^3}\left(\sqrt{\left(6\,643\,012\,500\,\pi^6\,C_{\text{MRB}}-15\,728\,640\sqrt{2}\;\pi\,\Phi-1\,887\,436\,800\,\pi^2\,\Phi+98\,304\,000\;\pi^2\,\Phi^2-45\,298\,483\,200\sqrt{2}\;\pi^3\,\Phi+4\,718\,592\,000\sqrt{2}\;\pi^3\,\Phi^2-163\,840\,000\sqrt{2}\;\pi^3\,\Phi^3-1\,087\,163\,596\,800\,\pi^4\,\Phi+169\,869\,312\,000\,\pi^4\,\Phi^2-11\,796\,480\,000\,\pi^4\,\Phi^3+307\,200\,000\,\pi^4\,\Phi^4-6\,522\,981\,580\,800\sqrt{2}\;\pi^5\,\Phi+1\,358\,954\,496\,000\sqrt{2}\;\pi^5\,\Phi^2-141\,557\,760\,000\sqrt{2}\;\pi^5\,\Phi^3+7\,372\,800\,000\sqrt{2}\;\pi^5\,\Phi^4-153\,600\,000\sqrt{2}\;\pi^5\,\Phi^5-31\,310\,311\,587\,840\,\pi^6\,\Phi+8\,153\,726\,976\,000\,\pi^6\,\Phi^2-1\,132\,462\,080\,000\,\pi^6\,\Phi^3+88\,473\,600\,000\,\pi^6\,\Phi^4-3\,686\,400\,000\,\pi^6\,\Phi^5+64\,000\,000\,\pi^6\,\Phi^6+2\,097\,152+150\,994\,944\sqrt{2}\;\pi+9\,059\,696\,640\,\pi^2+144\,955\,146\,240\sqrt{2}\;\pi^3+2\,609\,192\,632\,320\,\pi^4+12\,524\,124\,635\,136\sqrt{2}\;\pi^5+46\,251\,855\,056\,169\,\pi^6\right)+3375\,\pi^3\right)$$

(27*sqrt(((2^4 (16*32 – 64*Φ) + 1/5*16*2^5 (2(((2√2)/π)) + 16))/(24 (16 - 4) (16 - 8)))^6 - 322 - 123 - 18 + 4/5MRB const)+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\left(27 \sqrt{\left(\left(\frac{2^4 (16\times 32 - 64\,\Phi) + \frac{1}{5}\times 16\times 2^5 \left(2\times \frac{2\sqrt{2}}{\pi} + 16\right)}{24\,(16-4)\,(16-8)}\right)^6 - 322 - 123 - 18 + \frac{4}{5}\,C_{\text{MRB}}\right) + 1}\right) \text{^} (1/15) + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

Φ is the golden ratio conjugate

C_{MRB} is the MRB constant

Exact result

$$\sqrt[15]{27 \sqrt{\frac{4\,C_{\text{MRB}}}{5} + \frac{\left(16\,(512 - 64\,\Phi) + \frac{512}{5}\left(16 + \frac{4\sqrt{2}}{\pi}\right)\right)^6}{149\,587\,343\,098\,087\,735\,296} - 463} + 1} + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

Decimal approximation

1.64493797732582779868694537288251583738228842103960145786044935 82…

1.64493797732…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$\sqrt[15]{27 \sqrt{\frac{4\,C_{\text{MRB}}}{5} + \frac{4096\left(\pi\,(48 - 5\,\Phi) + 2\sqrt{2}\right)^6}{8\,303\,765\,625\,\pi^6} - 463} + 1} + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

$$\sqrt[15]{27 \sqrt{\frac{4\,C_{\text{MRB}}}{5} + \frac{\left(-1024\,\Phi + 8192 + \frac{512}{5}\left(16 + \frac{4\sqrt{2}}{\pi}\right)\right)^6}{149\,587\,343\,098\,087\,735\,296} - 463} + 1} + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

$$\frac{1}{\sqrt[5]{15}}\left(\left(\frac{1}{\pi^3}\left(\sqrt{\left(6\,643\,012\,500\,\pi^6\,C_{\mathrm{MRB}} - 15\,728\,640\,\sqrt{2}\,\pi\,\Phi - 1\,887\,436\,800\,\pi^2\,\Phi + \right.\right.\right.\right.$$
$$98\,304\,000\,\pi^2\,\Phi^2 - 45\,298\,483\,200\,\sqrt{2}\,\pi^3\,\Phi +$$
$$4\,718\,592\,000\,\sqrt{2}\,\pi^3\,\Phi^2 - 163\,840\,000\,\sqrt{2}\,\pi^3\,\Phi^3 -$$
$$1\,087\,163\,596\,800\,\pi^4\,\Phi + 169\,869\,312\,000\,\pi^4\,\Phi^2 -$$
$$11\,796\,480\,000\,\pi^4\,\Phi^3 + 307\,200\,000\,\pi^4\,\Phi^4 -$$
$$6\,522\,981\,580\,800\,\sqrt{2}\,\pi^5\,\Phi + 1\,358\,954\,496\,000\,\sqrt{2}\,\pi^5\,\Phi^2 -$$
$$141\,557\,760\,000\,\sqrt{2}\,\pi^5\,\Phi^3 + 7\,372\,800\,000\,\sqrt{2}\,\pi^5\,\Phi^4 -$$
$$153\,600\,000\,\sqrt{2}\,\pi^5\,\Phi^5 - 31\,310\,311\,587\,840\,\pi^6\,\Phi +$$
$$8\,153\,726\,976\,000\,\pi^6\,\Phi^2 - 1\,132\,462\,080\,000\,\pi^6\,\Phi^3 +$$
$$88\,473\,600\,000\,\pi^6\,\Phi^4 - 3\,686\,400\,000\,\pi^6\,\Phi^5 + 64\,000\,000\,\pi^6\,\Phi^6 +$$
$$2\,097\,152 + 150\,994\,944\,\sqrt{2}\,\pi + 9\,059\,696\,640\,\pi^2 +$$
$$144\,955\,146\,240\,\sqrt{2}\,\pi^3 + 2\,609\,192\,632\,320\,\pi^4 +$$
$$\left.\left.\left.\left.12\,524\,124\,635\,136\,\sqrt{2}\,\pi^5 + 46\,251\,855\,056\,169\,\pi^6\right)\right) +$$
$$3375\Big)\,\hat{}\,(1/15)\Big) + {C_{\mathrm{MRB}}}^{1-1/(4\pi)+\pi}$$

Observations and conclusions

Electromagnetic phenomena accompany periods of earthquakes, and which at that time often take the place of telluric motions. In addition to this, they predominate every year during one or two months which chooses between March and May or, at the latest, enters June and July. **The activity of the sun is the center of electromagnetic phenomena** (Michele Stefano De Rossi – "Meteorologia Endogena")

Recall that tidal force (generally used in the plural, tidal forces or tidal forces, and also with the expression tidal effects) is a secondary effect of the **force of gravity**. Tidal effects from different bodies can add up, as in the case of the alignment between the Moon and the Sun which gives rise to intense syzygial tides.

The undoubted correlation that Prof. De Rossi felt between the Corleone earthquakes and those of Monte Baldo last year moved me to pay special attention to the latter as well. Rummaging through the scientific yearbooks, I found the precise dates of the strongest earthquakes felt in 1866 on the slopes of Monte Baldo, namely: 13 June, 11 August and 7-8 November, which correspond to the new moons; in 1870 seismic activity reawakened there, but I don't know the dates; in 1876 the first strong shock occurred on April 23, that is, on the eve of the new moon; with the perigee (which took place on the 26th) the shocks prepared by the new moon continued until the 29th; then the frequency decreased until May 4th and it already seemed to have left those populations in peace; except that the next coincidence of the new moon with the perigee and with a strong northern declination (in which position, as I already said, one of the two passages to the meridian is an energetic occasion for an earthquake) provided me with such a clue of awakening, probably on a greater extent of land , that here I prepared myself for careful surveillance, so as not to miss the most important phases of the phenomenon, when this happened. I mentioned this probability to Prof. Don Timoteo Bertelli of Florence in my letter of May 1st and to Prof. Goiran of Verona in a letter of the same 12th. The critical day otherwise passed peacefully in Trieste; not so in Monte Baldo, where the tremors resumed on the 22nd and continued on the 23rd, to be repeated on the 29th; at the same time in Corleone the activity, which had seemed almost extinguished since the 10th, was reawakened with a shock on the 20th, one on the 21st, four on the 24th and with great energy on the 25th. On May 22nd, the eve of the new moon, the very strong earthquake also occurred of Spoleto and at the time of the new moon in question there was, it can be said, no region of the Apennines in which seismic activity did not manifest itself with greater or lesser force, as can be seen from the bulletin.

In Monte Baldo there was a truce during June; in July the tremors resumed the day after the full moon and continued thereafter without interruption; in the following months tremors were noted on August 7th, September 5th, October 9th and November 4th, that is, almost always one or two days after the full moon. It is remarkable that on May 22nd and 23rd, while the rest of Italy was shaking, there was a truce in Corleone and then an immediate awakening, and the truce that occurred in the new moons following Monte Baldo in the face of energy is equally significant. manifested itself at the same time as Corleone, where the endogenous forces were transported by geological-mechanical effects, which it is not my task to erudite. In 1870, as far as I can remember, the seismic period of Monte Baldo put an end to that of Monte Nevoso (Julian Alps). This began on February 28th with a strong tremor at 12.20 pm; the next day the shocks were repeated and so also on the day of the new moon, March 2, and the following; after a fifteen-day truce a shock was felt at the full moon; then there were other tremors, the dates of which I could not know; those that came to my attention, and were the strongest, occurred on April 28th (the eve of the new moon), on May 10th, on May 15th (full moon), on June 2nd (near the new moon) and several between the 13th and the 19th. June (full moon period). Then the activity died down there and arose in Monte Baldo. Monte Nevoso was frequently subject to earthquakes; in relatively recent times there was a long period from November 1750 to May 1753; and in 1838 the populations remained in suspense for three months. That local area includes the city of Rijeka; and even in the small earthquakes, which occur here from time to time, I have observed a decided prevalence of syzygies. From this we see that some seismic periods, although limited within very narrow boundaries, can be the effect of a large telluric cause. I took the Corleone period into special consideration, because this is one of the few whose phases have been carefully studied and from which there is a sufficiently large number of shocks to draw positive consequences. There was another seismic period of recent memory and well studied, that of Belluno; the existing relationship between it and the lunar positions has no need of my demonstrations, because the illustrious Falb proved it since he predicted, based on his theories, the return of the phenomenon even during the course of the period itself.

Perhaps all the seismic phenomena that occur in Italy have as their cause, if not direct, at least determining, the action of the stars, but while on the one hand the lack of sufficient observations does not allow very extensive studies, on the other hand the translocation, which often happens, seismic centers distract the attention of investigators so as not to allow them to glimpse the effects of a great common cause in isolated phenomena.

It is desirable that the invitation made repeatedly by Prof. Cav. De Rossi, in order to obtain the greatest possible number of reports on seismic phenomena, must be listened to by those who have the progress of science at heart and that no one abstains from communicating even crude observations of such phenomena, the memory of which without this could be lost to the detriment of science. (**DELL' ATTRAZIONE LUNI- SOLARE IN RELAZIONE COI FENOMENI MAREO – SISMICI** - STUDI DIMOSTRATIVI DI GIULIO GRABLOVITZ – 1877)

In conclusion:

While **the activity of the sun is the center of electromagnetic phenomena,** the tidal force, hence the luni-solar attraction, is a secondary effect of the **force of gravity**. The **aurora borealis**, for example, is a phenomenon visually characterized by luminous bands that take on a wide range of shapes and colours, rapidly changing in time and space, usually red-green-blue in colour, called auroral arcs, caused from the interaction of charged particles (protons and electrons) of solar origin (solar wind) with the terrestrial ionosphere (atmosphere between 100-500 km): these particles excite the atoms of the atmosphere which, subsequently de-energizing, emit light of various lengths 'wave. Solar activity is a source of emission of **electromagnetic waves** and **electrically charged particles**, the luni-solar attraction, is a secondary effect of the **force of gravity**. It is therefore possible to hypothesize a connection, albeit indirect, between these phenomena and "**gravitational waves**" which, among other things, travel at a speed equal to c (speed of light), as well as **electromagnetic waves**. Thus, there is a purely mathematical connection between seismic waves and gravitational waves.

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

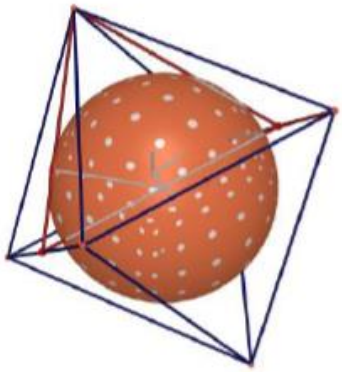


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.141939571526584308924330732196162632677513386811659044682541739 3

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$
$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

$4096 = 64^2$, (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$).

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.6180\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^8\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^8\right)^k}{k!}\right)\quad\text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$
$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi e^0 \approx 3.1416$ (real, principal root)

$\pi e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1\sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003$ (real, principal root)

$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003$ (real root)

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\,\pi\left\lfloor\frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{8}{\pi^2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} =$$

$$\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} =$$

$$\sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\mathrm{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13
…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\Big/\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}(C\times \mathrm{R}\times 2.33\cdot 10^{-13})}}\cong 1.61803398\ldots=\frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.6180359123482642354401744088347098542545273508401733563064818107 …

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\, x^2\, y\, z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$ is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.6018401361\times 10^{-24}\right)}}$$

1.6180329973075324915067570166297467464225772608929671407919395903

…

1.6180329973075…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.4525642121\times 10^{-24}\right)}}$$

Result

1.6449323521020921304838989837041511688766218416551668779141660338

…

1.64493235210209213…. ≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

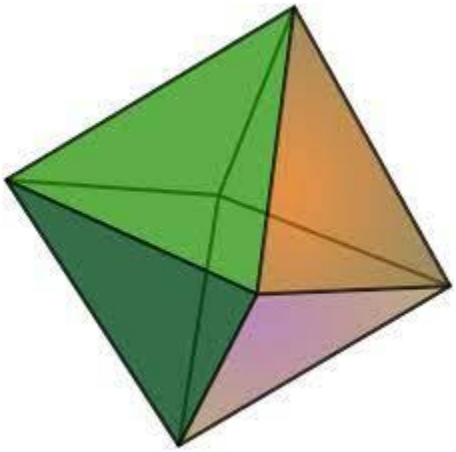
Result

3.14159225731469939939950039231605796469731171781644423955790024797

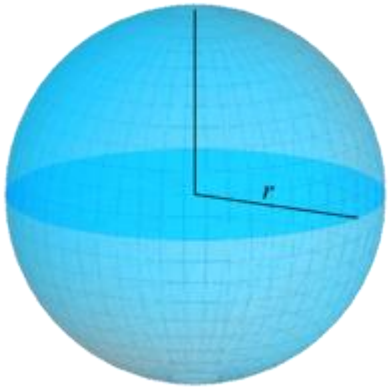
…

3.14159225731469…. ≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find *a*, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

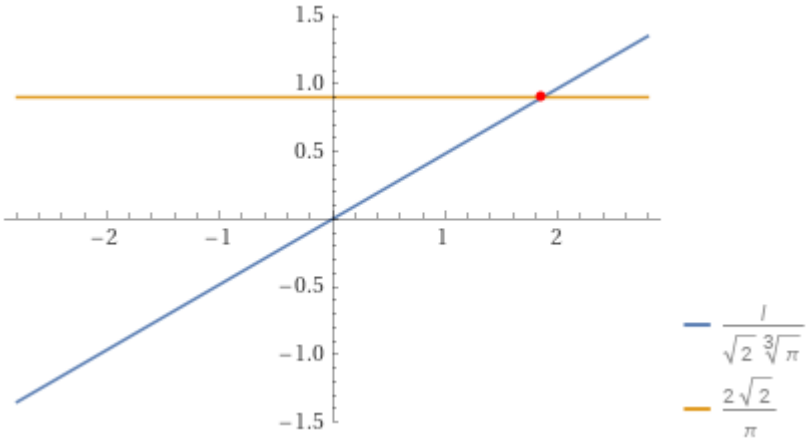
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,3}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not}\ (z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

1.64381856858…. $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\wedge(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-\right.\right.\right.\right.$$
$$\left.\left.\left.\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\right/\right.\right.$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\text{^}(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-\right.\right.\right.\right.$$
$$\left.\left.\left.\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\right/\right.\right.$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\text{^}(1/15)\right)$$
for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)}\quad\text{for } (0<\gamma<-\operatorname{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

–5.010882647757…

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\,\sqrt{6}}\right)^2\right\} = 0$$

$$\text{for } b = -\frac{226\,802\,245}{18\,480\,874}$$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

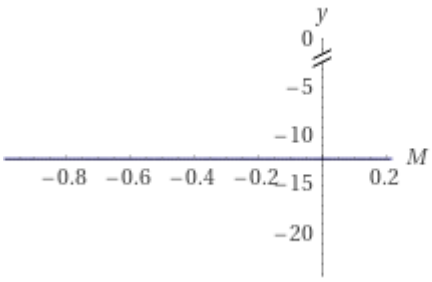
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

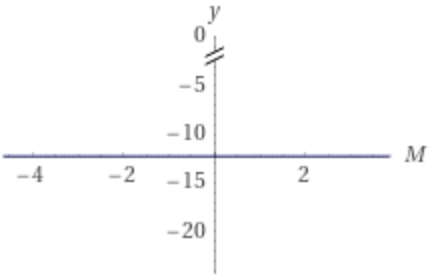
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

$$-12.2723$$

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V = \frac{1}{3}(0.0814845\,b + 1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

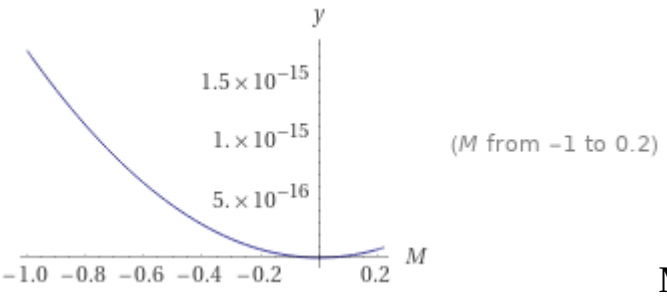
Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\,M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

Result:

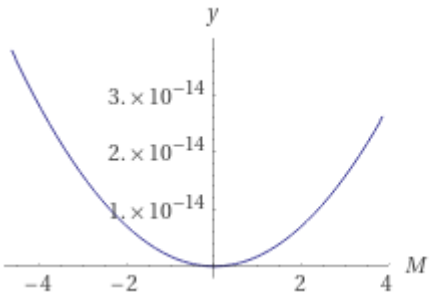
0

Plots: **(possible mathematical connection with an open string)**



M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O\left(M^{62194}\right)$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{1}{3}M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2\left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^{-16}

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times 10^{-17}$

7.021621519159*10^{-17}

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

$1.57986484181*10^{-14}$

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 2^2 + 6.58545 \times 10^{-10}\sqrt{2^4}\right)}{2^2} + 1\right)^2 \times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_{0}}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\,\hat{}\,(1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

$5.729475 * 10^{-35}$ Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

$1.820306 * 10^{61}$ V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

$5.975498*10^{-8}$ V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

$1.042940*10^{27}$ V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

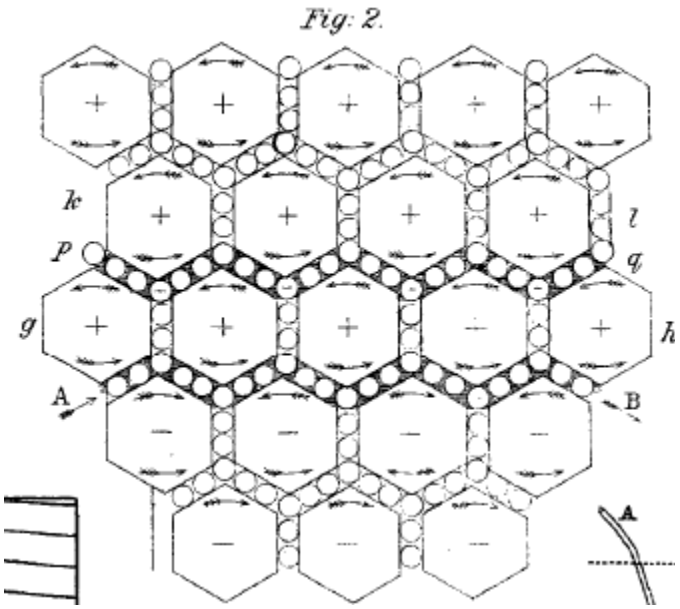
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

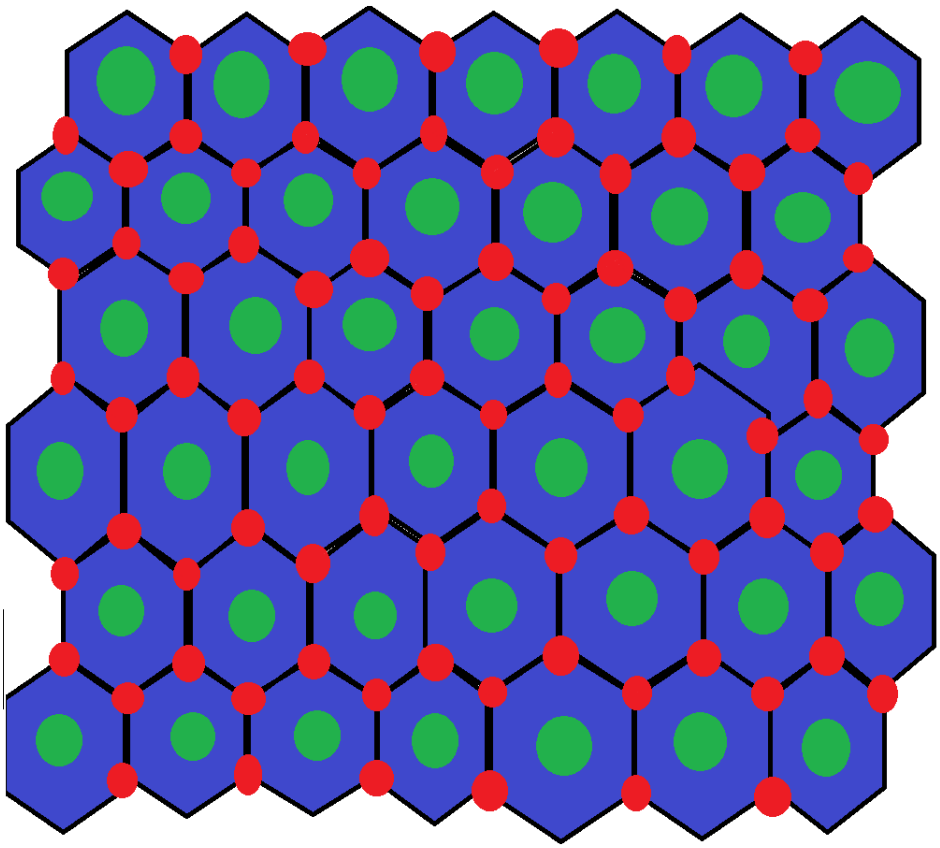
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

An Update on Brane Supersymmetry Breaking - *Jihad Mourad and Augusto Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On some equations concerning the seismology and the calculation relating to the tides and solar eclipses. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory VI

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper (part VI), we analyze some equations concerning the seismology and the calculation relating to the tides and solar eclipses. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory

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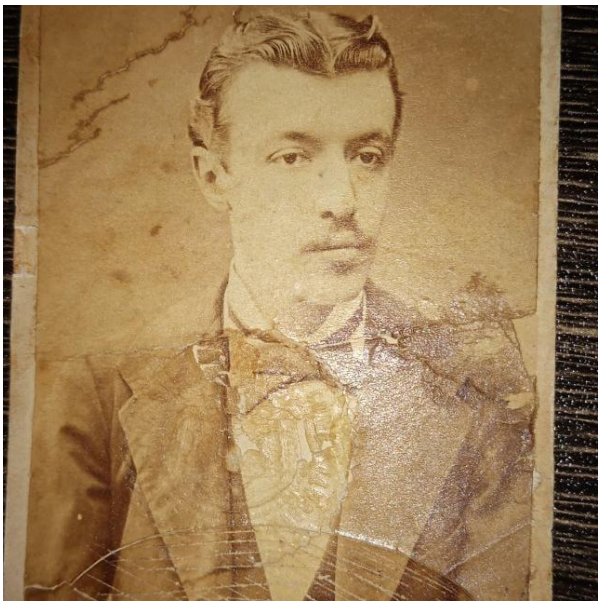
A. Nardelli studied at the Università degli Studi di Napoli Federico II - Dipartimento di Studi Umanistici – **Sezione Filosofia - scholar of Theoretical Philosophy**

Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

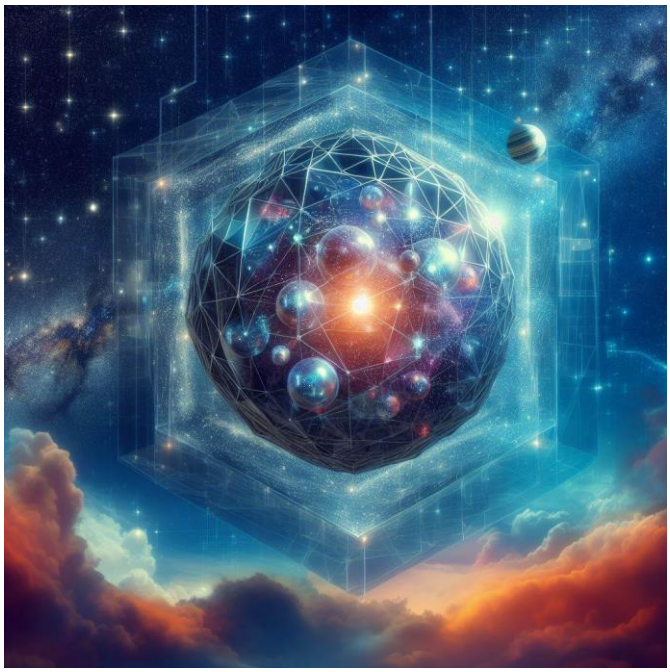
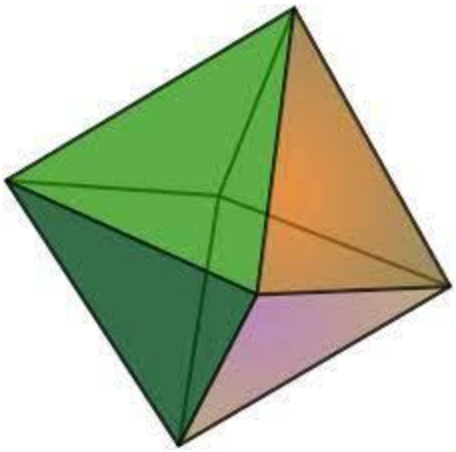
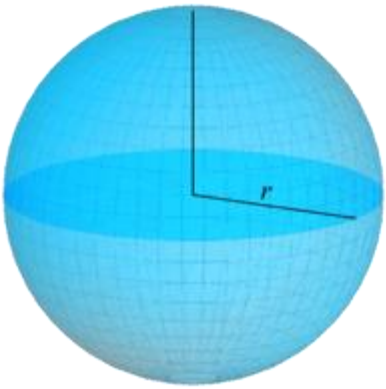


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\pi x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$l = 0, \quad x = 0$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt{2}\ \sqrt[3]{\pi}\right) = \log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\ \pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

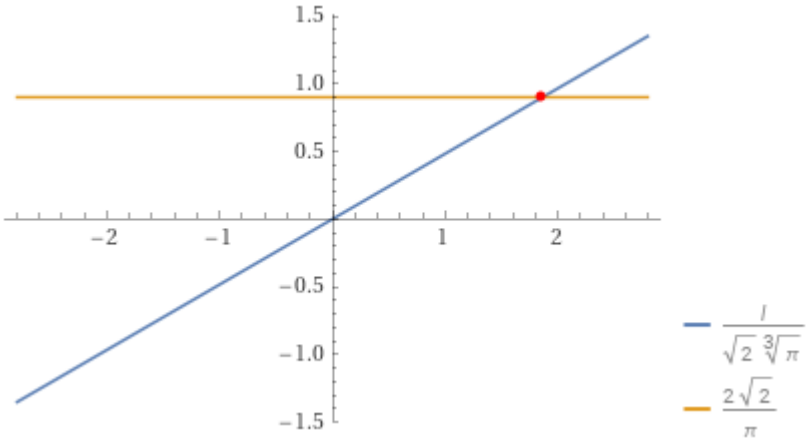
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

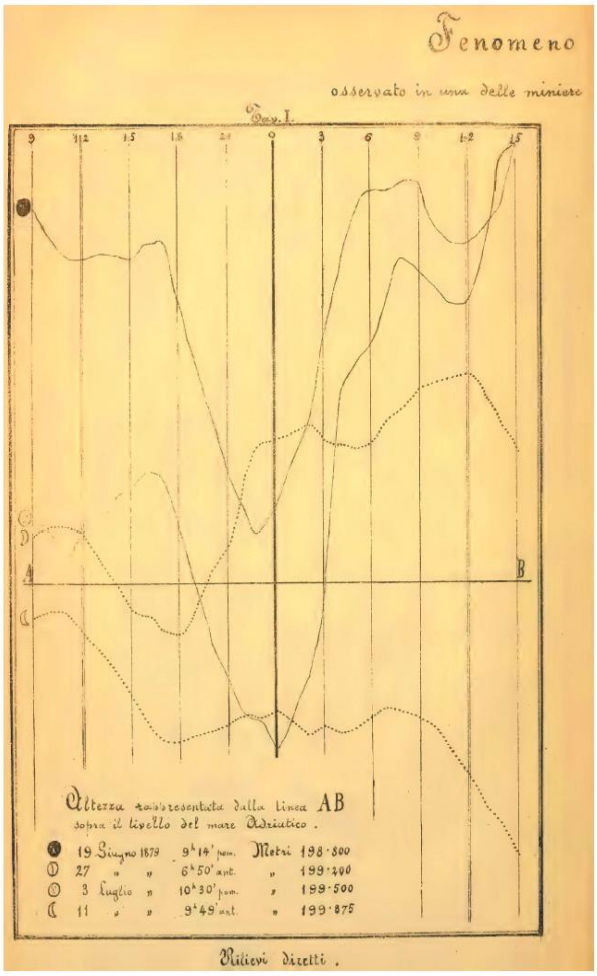
Plot

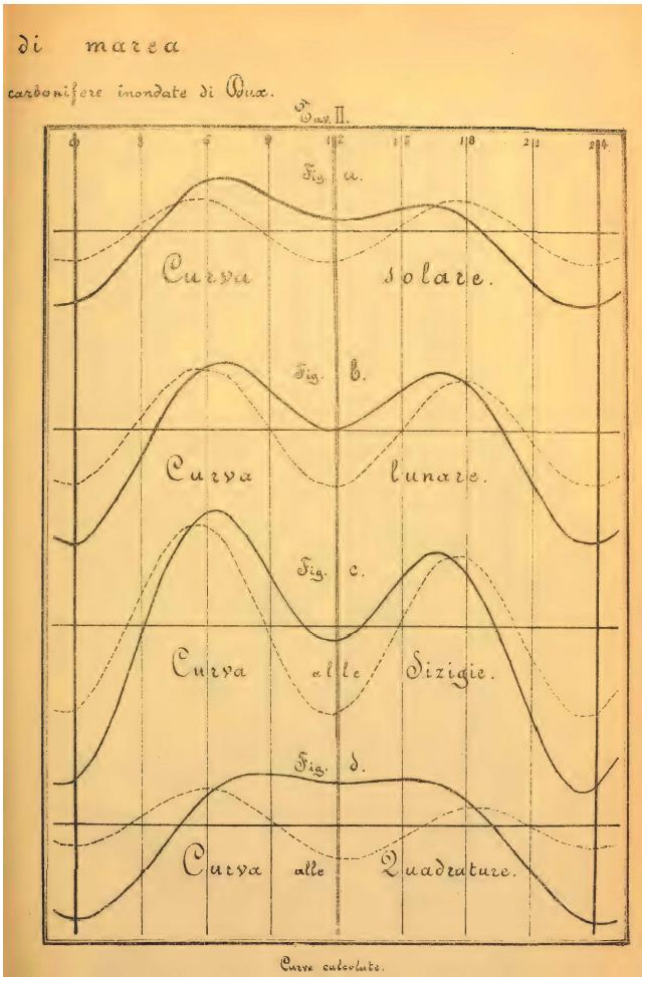


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

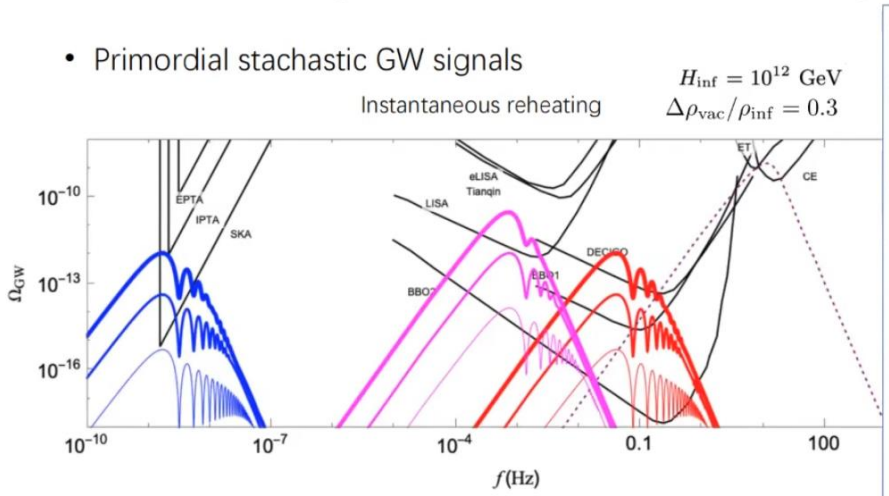

di marea
carbonifere inondate di Pux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

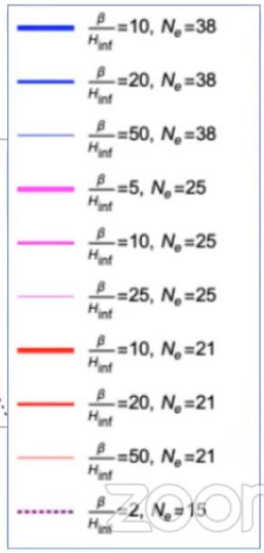
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

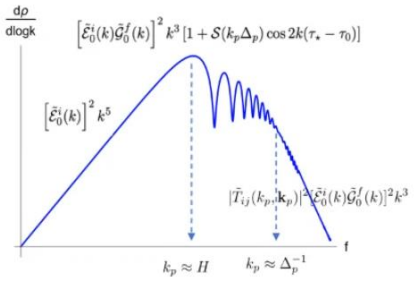
Comparison between primary GW and secondary GW

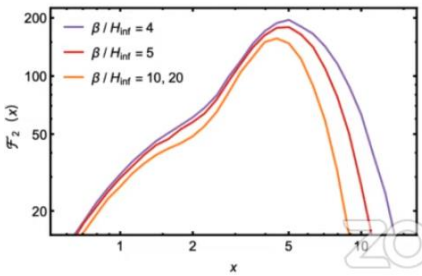
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





From

NUOVA TEORIA SISMICA DELLE MAREE - BREVE ESPOSIZIONE DI *GIULIO GRABLOVITZ* – TRIESTE, STABILIMENTO TIPOGRAFICO APPOLONIO & CAPRIN – 1876

On the tides of the Adriatic

Le osservazioni, che mi servirono di base nel calcolare gli elementi del fenomeno delle maree, sono quelle del Mareografo di Venezia, le quali vengono pubblicate, benchè non molto regolarmente dalla „Gazzetta di Venezia.“ Gettando un'occhiata su quelle indicazioni, appaiono singolari e degne d'attenzione le seguenti circostanze a cui vanno soggette le nostre maree, cioè:

1. La più forte marea avviene quasi sempre il giorno del plenilunio o del novilunio, anzichè in ritardo, come su altre coste.

2. Nelle quadrature fra l'alta e la bassa marea o viceversa, scorrono talvolta 16 ore, talchè nel corso di 24 ore non si verifica che una marea; fenomeno che si appella *morto d'acqua*.

3. Il livello medio calcolato in base a quattro maree consecutive è massimo in autunno, minimo in primavera; massimo nelle forti declinazioni lunari, minimo al nodo.

4. Le più forti differenze fra alta e bassa marea hanno luogo dopo i solstizi, al contrario di quanto succede in altri mari.

5. All'estate l'alta marea mattutina nelle sizigie ritarda sulla vespertina; all'inverno succede il contrario; agli equinozi si osservano quasi alla stessa ora.

Morto d'acqua: periodo durante il quale l'ampiezza di marea, ovvero la differenza tra un'alta e la bassa marea successiva, è minima e perciò l'acqua scorre più lentamente. Ha luogo nei periodi di quadratura (quarti di Luna)

Ora passo all'esposizione degli elementi generali della marea pel porto di Venezia basati sulla seguente legge speciale per l'Adriatico:

"La marea adriatica si forma alla latitudine di 38° a 39°, in causa delle oscillazioni impresse al suolo dall'attrazione luni-solare presso all'imbocco del mare Adriatico.„

Questa parte flessibile della crosta terrestre che, secondo tutte le apparenze, ha sede negli arcipelaghi d'indole vulcanica della Sicilia e della Grecia, ha per centro assai probabilmente il monte Etna.

L'unità della marea totale è di Metri 1.34, di cui 0,84 è il coefficente di salita e 0,50 quello di discesa rispetto al livello normale; le discese sono proporzionali alle salite che le precedono. Il movimento del suolo ha luogo secondo tutte le apparenze fra 38° e 39° di latitudine nord, ma questo punto non può venir fissato per ora esattamente ed occorrerebbe, come si vedrà in appresso, un altro genere d'osservazioni, per istabilirlo con precisione. Alla latitudine indicata il sole e la luna non passano mai allo zenith, percui il coefficente dell'effetto è *sempre* inferiore all'unità ed è precisamente uguale al quadrato del seno dell'altezza, ossia *2 log. sen A.* Quando la luna ed il sole si trovano alla distanza angolare di 90° fra loro, cioè in quadratura, l'effetto è uguale a $5/_{12}$ dell'effetto totale alle sizigie, secondo le leggi generali delle maree; l'effetto varia pure a seconda della distanza del sole e della luna, in ragione del cubo.

La differenza fra il coefficente dell'ascesa e quello della discesa è dovuta a ciò che nella prima concorrono e l'innalzamento del suolo e l'inerzia del movimento da esso impresso all'acqua, mentre nella discesa opera la sola inerzia, senza la quale l'acqua si rimetterebbe semplicemente al livello normale.

La marea risultante dalle due maree semidiurne, i cui effetti si contrappongono esattamente, giunge al suo massimo allorchè dovrebbe aver luogo la più forte delle due alte maree, ed al suo minimo all'ora della più debole. — Allorchè la declinazione lunare è nulla, è pure nulla la detta marea, che chiamerò *diurna*, per distinguerla dalla *semidiurna* che ha origine dal movimento del suolo. In conseguenza della marea diurna, si genera fra il settentrione del Mare Adriatico e le parti meridionali del Mediterraneo, un' altalena ondosa, che per la sua regolarità non cesserebbe d' un tratto, se anche cessasse l'azione luni-solare; per tal motivo i suoi movimenti non corrispondono alle posizioni astronomiche del giorno in cui avvengono, ma a quelle di 3 giorni prima e l'alta o la bassa marea succede da 2 a 3 ore dopo il passaggio al meridiano; di conseguenza raggiunge il suo massimo dopo il passaggio più vicino allo zenith od al nadir ed il minimo dopo quello più lontano da uno dei detti punti.

Dalle osservazioni del mareografo di Venezia, trovai che il massimo valore di questa marea è di 25 a 30 centimetri allorchè la luna ed il sole hanno una declinazione massima all'epoca delle sizigie (il che avviene dopo i solstizi). Allora la marea risultante è = 0.10 ossia equivale ad un decimo dell'effetto totale, il che s'accorda assai prossimamente con l'altezza razionale delle maree desunta dalle leggi dell'attrazione universale.

che sono l'effetto della sovrapposizione delle maree semi-diurna e diurna, l'alta marea ha luogo in autunno intorno al mezzodì e la bassa intorno alla mezzanotte, ed in primavera accade il contrario, il che è facile a spiegarsi riflettendo che le declinazioni sono di segno contrario a parità delle altre posizioni astronomiche. Or bene: mentre in autunno la differenza fra le due maree accennate è di 40 a 50 centimetri, in primavera sale fino a 70 centimetri, il che darebbe indizio d'una marea diurna costante, ma di pochissima importanza (forse di 10 centimetri) dovuta probabilmente alla forza centrifuga, che pei moti combinati di rotazione e rivoluzione, essendo più forte all'equatore al mezzodì che alla mezzanotte, spingerebbe perciò le acque al mezzodì fuori dell'Adriatico, per ritirarle di nuovo alla mezzanotte.

apprezzabili; i calcoli fatti su questa base mi ricondussero alla latitudine di 38° a 39°; trovai un'eccezione intorno al novilunio del 3 Luglio 1875 in cui la declinazione lunare era = + 28° e consisteva in ciò, che le discese *non eccedevano metri 1.15*, e si mantenevano quasi stazionarie per 5 giorni malgrado l'incremento dell'influenza lunare; mi mancano

A completare gli elementi atti a calcolare le maree, mi resta ad aggiungere solamente che l'alta marea prodotta dal movimento del suolo non eccede mai 72 centimetri; e la bassa marea s'arresta a 43 c.; la somma è uguale al limite sovraccennato di m. 1.15.

Lo stabilimento del porto di Patrasso è di 6^h 54′; a prima vista potrà sembrare che ciò male si accordi con la mia teoria, perchè Patrasso, trovandosi vicino al punto radiante più assai della Sirti minore (il cui stabilimento è di 3^h 10′) e delle bocche di Cattaro (3^h 45′), dovrebbe sentire l'urto della marea assai prima di queste due località; l'apparente sconcordanza sparisce, quando si rifletta che nei punti più vicini al movimento del suolo, il primo effetto è di necessità la bassa marea, perchè ivi è il suolo che si solleva e l'acqua necessariamente s'abbassa.

Fatta questa considerazione diventa un errore il calcolare lo stabilimento di quei punti in base all'alta marea, mentre converrebbe riferirlo alla bassa marea; in tal modo lo stabilimento del porto di Patrasso si ridurrebbe a 0^h 54′, cifra che non ha bisogno di commenti.

È ovvio che in tali punti debba invertirsi la legge riguardo la relazione ch'esiste fra salite e discese; vale a dire, le *salite* debbono essere proporzionali alle *discese*, da cui son *precedute*.

in cui si manifestano le maree a Messina; benchè manchino dati precisi, si sa che sono molto irregolari ed assai più repentine che nell'Adriatico, vale a dire che i momenti della massima e minima altezza si possono valutare ad occhio senza errore apprezzabile, mentre a Trieste od a Venezia il più attento osservatore può ingannarsi di 15 minuti, senza l'aiuto di strumenti autoregistratori. Ne attribuisco la causa alla grande vicinanza del punto radiante, verso il quale tutte le acque convergono *contemporaneamente* nel momento della massima depressione del suolo, mentre ne divergono nella stessa guisa nel caso opposto. Probabilmente l'imponente vortice di Cariddi ha relazione col fenomeno delle maree, tanto più che il terremoto avvenuto in Sicilia ed in Calabria dopo il mezzodì del 5 febbraio 1783 ne scemò, a quanto si asserisce, la violenza.

BERNA
SVIZZERA
LIECH.
VADUZ
AUSTRIA
UNGHERIA
SLOVENIA
FRANCIA
CROAZIA
MONACO
MAR LIGURE
MAR TIRRENO
MAR MEDITERRANEO
MARE ADRIATICO
MAR IONIO
BOSNIA ERZEGOVINA
SERBIA
CORSICA (FR.)
SARDEGNA
SICILIA
ALGERIA
TUNISIA
MALTA
ROMA
VENEZIA
GOLFO DI VENEZIA
GOLFO DI TARANTO
STRETTO DI OTRANTO
STRETTO DI SICILIA
ISOLE EOLIE
ISOLE PELAGIE
BOLZANO
TRENTO
BELLUNO
UDINE
GORIZIA
TRIESTE
PORDENONE
TREVISO
PADOVA
VERONA
BRESCIA
MILANO
COMO
VARESE
NOVARA
VERCELLI
TORINO
AOSTA
PAVIA
PIACENZA
PARMA
FERRARA
RAVENNA
BOLOGNA
RIMINI
PESARO
ANCONA
ASTI
ALESSANDRIA
CUNEO
GENOVA
SAVONA
IMPERIA
LA SPEZIA
MASSA
LUCCA
PISTOIA
FIRENZE
PISA
LIVORNO
SIENA
AREZZO
GROSSETO
PERUGIA
ELBA
VITERBO
TERNI
RIETI
L'AQUILA
PESCARA
CHIETI
ASCOLI PICENO
MACERATA
FOGGIA
CAMPOBASSO
ISERNIA
FROSINONE
LATINA
CASERTA
NAPOLI
AVELLINO
SALERNO
BARI
BARLETTA
MATERA
POTENZA
TARANTO
BRINDISI
LECCE
OTRANTO
COSENZA
CATANZARO
REGGIO DI CALABRIA
MESSINA
TRAPANI
PALERMO
ENNA
CATANIA
CALTANISSETTA
AGRIGENTO
SIRACUSA
RAGUSA
OLBIA
SASSARI
NUORO
ORISTANO
CAGLIARI
TUNISI
VALLETTA
47°
46°
45°
44°
43°
42°
41°
40°
39°
38°
37°
36°
7°
8°
9°
10°
11°
12°
13°
14°
15°
16°
17°
18°

From

Renato Caccioppoli – **Analisi Matematica I**

We analyze the following equation:

$$a + ib = \rho(\cos\theta + i\,\mathrm{sen}\,\theta).$$

We consider:

(ρ*(cos(θ) + i sin(θ)))

Input

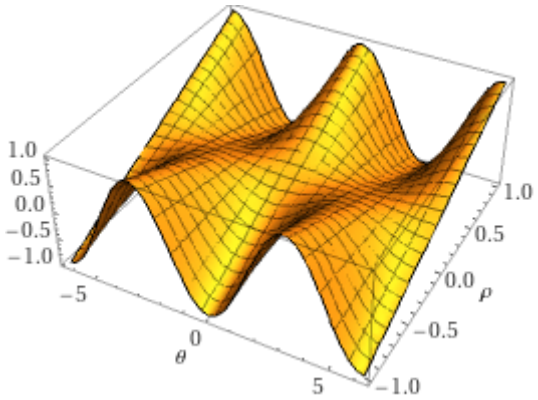
$\rho\,(\cos(\theta) + i\sin(\theta))$

i is the imaginary unit

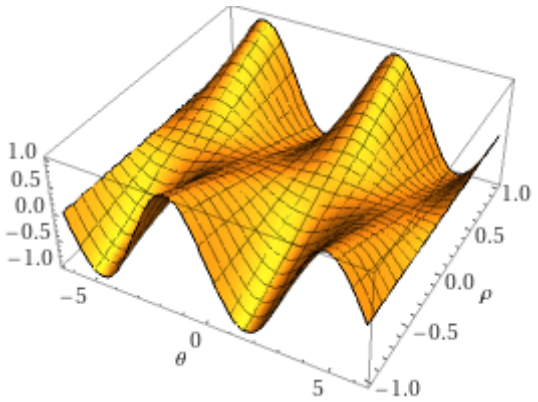
3D plots

Real part **(figures that can be related to the D-branes/Instantons)**

The key observation from the below plots and is that at $\rho = 1$, which is taken as the energy density of the universe at the Big Bang, with $\theta = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.

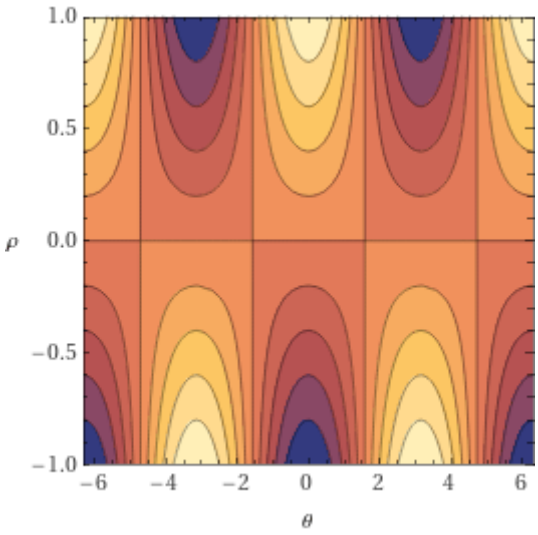


Imaginary part

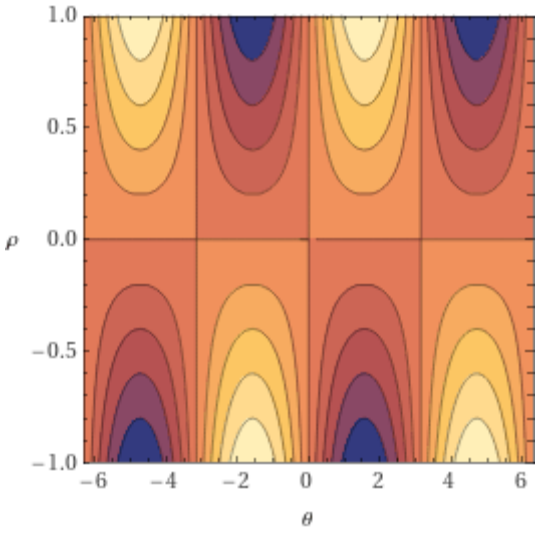


Contour plots

Real part



Imaginary part



Alternate form

$e^{i\theta}\rho$

Reduced trigonometric form

$\rho\cos(\theta) + i\rho\sin(\theta)$

Root

$\rho = 0$

Property as a function

Periodicity

periodic in θ with period 2π

Series expansion at θ=0

$$\rho + i\,\theta\,\rho - \frac{\theta^2\,\rho}{2} - \frac{1}{6}\,i\,\theta^3\,\rho + \frac{\theta^4\,\rho}{24} + O\left(\theta^5\right)$$

(Taylor series)

Derivative

$$\frac{\partial}{\partial\theta}(\rho\,(\cos(\theta) + i\,\sin(\theta))) = i\,\rho\,(\cos(\theta) + i\,\sin(\theta))$$

Indefinite integral

$$\int \rho\,(\cos(\theta) + i\,\sin(\theta))\,d\theta = -i\,e^{i\,\theta}\,\rho + \text{constant}$$

Alternative representations

$$\rho\,(\cos(\theta) + i\,\sin(\theta)) = \rho\left(\cosh(i\,\theta) + i\,\cos\left(\frac{\pi}{2} - \theta\right)\right)$$

$$\rho\,(\cos(\theta) + i\,\sin(\theta)) = \rho\left(\cosh(-i\,\theta) - i\,\cos\left(\frac{\pi}{2} + \theta\right)\right)$$

$$\rho\,(\cos(\theta)+i\,\sin(\theta)) = \rho\left(\cosh(-i\,\theta)+i\,\cos\left(\frac{\pi}{2}-\theta\right)\right)$$

$\cosh(x)$ is the hyperbolic cosine function

Series representations

$$\rho\,(\cos(\theta)+i\,\sin(\theta)) = \sum_{k=0}^{\infty}\frac{(-1)^k\left(\theta^{2k}+i\left(-\frac{\pi}{2}+\theta\right)^{2k}\right)\rho}{(2k)!}$$

$$\rho\,(\cos(\theta)+i\,\sin(\theta)) = \sum_{k=0}^{\infty}\frac{(-1)^k\,\theta^{2k}\,\rho\,(i\,\theta\,(2k)!+(1+2k)!)}{(2k)!\,(1+2k)!}$$

$$\rho\,(\cos(\theta)+i\,\sin(\theta)) = \sum_{k=0}^{\infty}\frac{(-1)^k\left(i\,\theta^{1+2k}-\left(-\frac{\pi}{2}+\theta\right)^{1+2k}\right)\rho}{(1+2k)!}$$

$n!$ is the factorial function

Integral representations

$$\rho\,(\cos(\theta)+i\,\sin(\theta)) = \int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{s-\theta^2/(4\,s)}\,(-2\,i\,s+\theta)\,\rho}{4\,\sqrt{\pi}\;s^{3/2}}\,ds \quad \text{for } \gamma>0$$

$$\rho\,(\cos(\theta)+i\,\sin(\theta)) = \frac{i\,\rho\left(-\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{s-\theta^2/(4\,s)}}{\sqrt{s}}\,ds+2\,\sqrt{\pi}\;\theta\int_0^1\cos(t\,\theta)\,dt\right)}{2\,\sqrt{\pi}} \quad \text{for } \gamma>0$$

$$\rho\,(\cos(\theta)+i\,\sin(\theta)) = -\frac{\rho\left(-\theta\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{s-\theta^2/(4\,s)}}{s^{3/2}}\,ds+4\,\sqrt{\pi}\;\int_{\frac{\pi}{2}}^{\theta}\sin(t)\,dt\right)}{4\,\sqrt{\pi}} \quad \text{for } \gamma>0$$

From the indefinite integral result

$$\int \rho\,(\cos(\theta) + i\sin(\theta))\,d\theta = -i\,e^{i\theta}\,\rho + \text{constant}$$

we obtain:

-i e^(i θ) ρ

Input

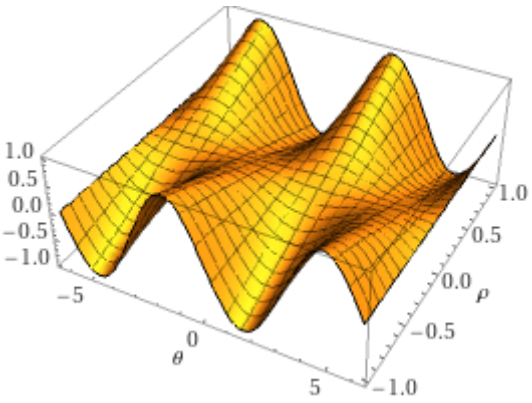
$$-i\,e^{i\theta}\,\rho$$

i is the imaginary unit

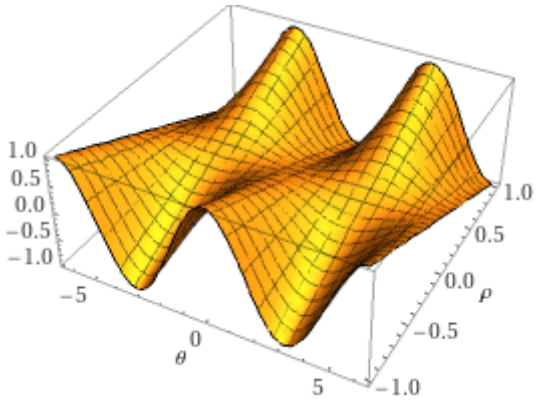
3D plots

Real part **(figures that can be related to the D-branes/Instantons)**

The key observation from the below plots and is that at $\rho = 1$, which is taken as the energy density of the universe at the Big Bang, with $\theta = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.

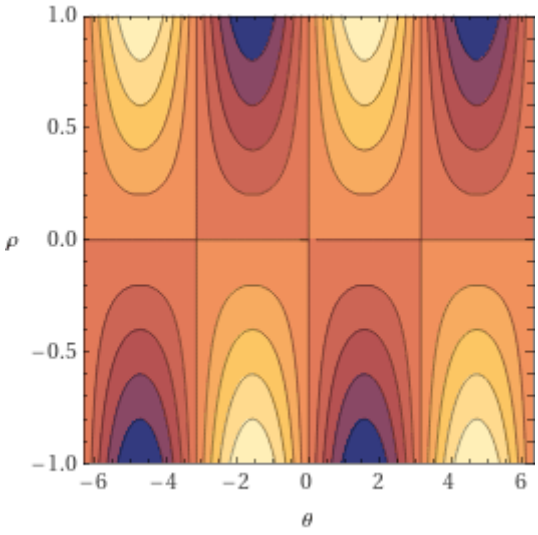


Imaginary part

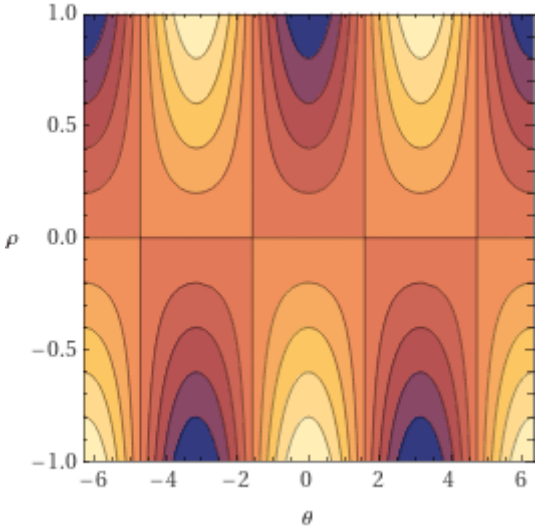


Contour plots

Real part



Imaginary part



Alternate form

$\rho\,(\sin(\theta) - i\cos(\theta))$

Alternate form assuming θ and ρ are real

$\rho\sin(\theta) - i\,\rho\cos(\theta)$

Root

$\rho = 0$

Property as a function

Periodicity

periodic in θ with period 2π

Series expansion at θ=0

$$-i\,\rho + \theta\,\rho + \frac{1}{2}\,i\,\theta^2\,\rho - \frac{\theta^3\,\rho}{6} - \frac{1}{24}\,i\,\theta^4\,\rho + O\left(\theta^5\right)$$

(Taylor series)

Derivative

$$\frac{\partial}{\partial\theta}\left(-i\,e^{i\,\theta}\,\rho\right) = e^{i\,\theta}\,\rho$$

Indefinite integral

$$\int -i\,e^{i\,\theta}\,\rho\,d\theta = -\rho\,(\cos(\theta) + i\,\sin(\theta)) + \text{constant}$$

Alternative representations

$$-i\left(e^{i\,\theta}\,\rho\right) = -i\left(z^{i\,\theta}\,\rho\right) \text{ for } z = e$$

$$-i\left(e^{i\,\theta}\,\rho\right) = -i\left(w^{a}\,\rho\right) \text{ for } a = \frac{i\,\theta}{\log(w)}$$

$$-i\left(e^{i\,\theta}\,\rho\right) = -i\left(\rho\left(1 + \frac{2}{-1 + \coth\left(\frac{i\,\theta}{2}\right)}\right)\right)$$

$\log(x)$ is the natural logarithm

$\coth(x)$ is the hyperbolic cotangent function

Series representations

$$-i\left(e^{i\,\theta}\,\rho\right) = -i\,\rho\sum_{k=0}^{\infty}\frac{(i\,\theta)^{k}}{k!}$$

$$-i\left(e^{i\,\theta}\,\rho\right) = -i\,\rho\sum_{k=-\infty}^{\infty} I_{k}(i\,\theta)$$

$$-i\left(e^{i\theta}\rho\right) = -\frac{i\rho\sum_{k=0}^{\infty}\frac{(i\theta)^{2k}(-2ik+\theta)}{(2k)!}}{\theta}$$

$n!$ is the factorial function

$I_n(z)$ is the modified Bessel function of the first kind

Definite integral over a square of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L} -i\,e^{i\theta}\,\rho\,d\rho\,d\theta = 0$$

Definite integral over a disk of radius R

$$\iint_{\theta^2+\rho^2<R^2} -i\,e^{i\theta}\,\rho\,d\theta\,d\rho = 0$$

From the above series expansion:

$$-i\rho + \theta\rho + \frac{1}{2}i\theta^2\rho - \frac{\theta^3\rho}{6} - \frac{1}{24}i\theta^4\rho + O\left(\theta^5\right)$$

(Taylor series)

we obtain:

-i ρ + θ ρ + 1/2 i θ^2 ρ - (θ^3 ρ)/6 - 1/24 i θ^4 ρ + (θ^5)

Input

$$-i\rho + \theta\rho + \frac{1}{2}i\theta^2\rho - \frac{1}{6}\left(\theta^3\rho\right) - \frac{1}{24}i\theta^4\rho + \theta^5$$

i is the imaginary unit

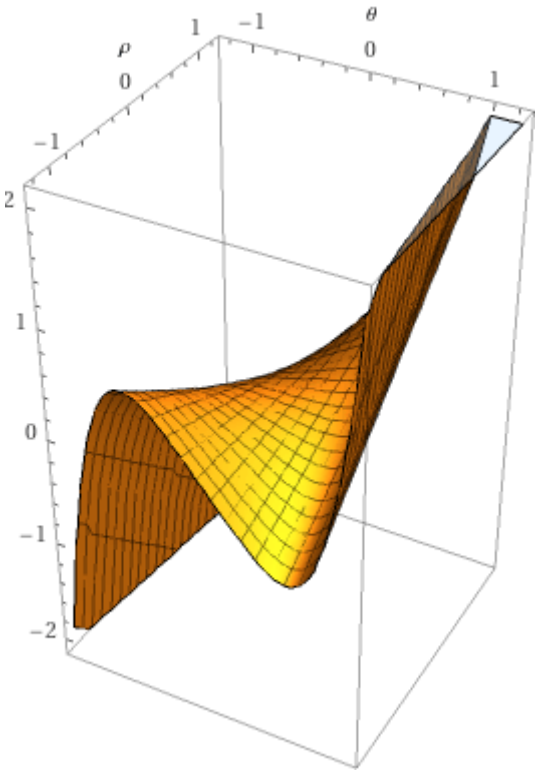
Result

$$\theta^5 - \frac{1}{24} i \theta^4 \rho - \frac{\theta^3 \rho}{6} + \frac{1}{2} i \theta^2 \rho + \theta \rho - i \rho$$

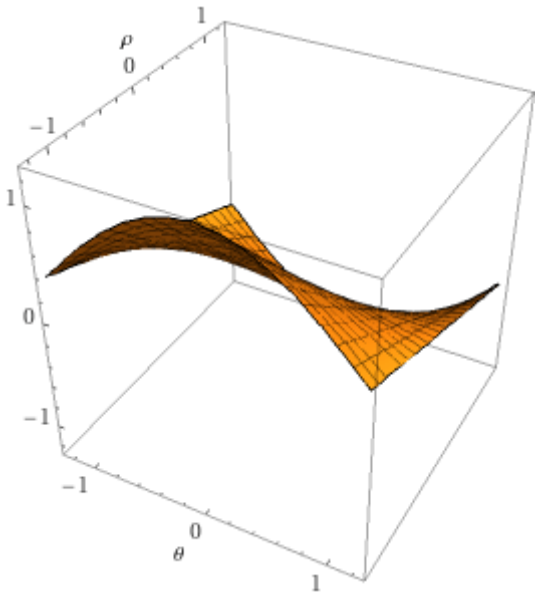
3D plots

Real part **(figures that can be related to the D-branes/Instantons)**

The key observation from the below plots and is that at $\rho = 1$, which is taken as the energy density of the universe at the Big Bang, with $\theta = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.

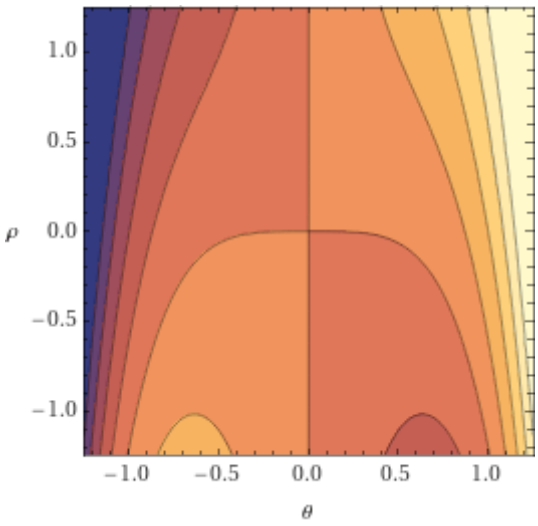


Imaginary part

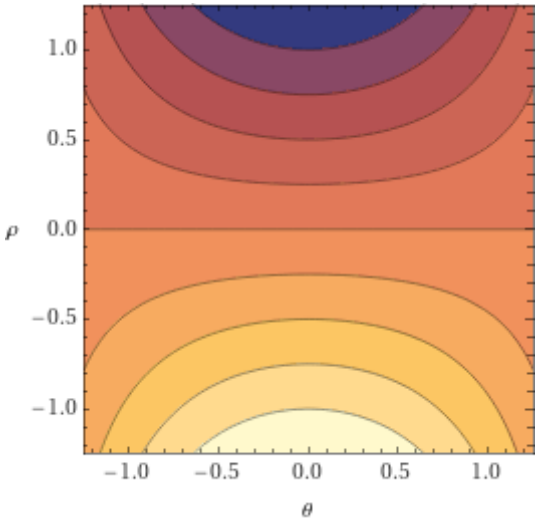


Contour plots

Real part



Imaginary part



Alternate forms

$$\frac{1}{24}\left(24\,\theta^5 - i\,\theta^4\,\rho - 4\,\theta^3\,\rho + i\,12\,\theta^2\,\rho + 24\,\theta\,\rho - 24\,i\,\rho\right)$$

$$\theta^5 - \frac{1}{24}\,i\,(-12 + \theta\,(\theta - 4\,i))\,\theta^2\,\rho + \theta\,\rho - i\,\rho$$

$$\theta^5 + \left(\theta\left(1 + \theta\left(\left(-\frac{1}{6} - \frac{i\,\theta}{24}\right)\theta + \frac{i}{2}\right)\right) - i\right)\rho$$

Alternate form assuming θ and ρ are real

$$\theta^5 - \frac{\theta^3\,\rho}{6} - \frac{1}{24}\,i\left(\theta^4 - 12\,\theta^2 + 24\right)\rho + \theta\,\rho$$

Root

$$\theta^4 - 4\,i\,\theta^3 - 12\,\theta^2 + 24\,i\,\theta + 24 \neq 0\,, \quad \rho = -\frac{24\,i\,\theta^5}{\theta^4 - 4\,i\,\theta^3 - 12\,\theta^2 + 24\,i\,\theta + 24}$$

Roots

$\theta \approx -3.07638\,, \quad \rho \approx 155.138$

$\theta \approx -1.59245\,, \quad \rho \approx -11.1384$

$\theta \approx 1.59245\,, \quad \rho \approx -11.1384$

$\theta \approx 3.07638\,, \quad \rho \approx 155.138$

Polynomial discriminant

$$\Delta_\theta = \frac{\rho^8 - 672\,\rho^7 + 176\,256\,\rho^6 - 21\,510\,144\,\rho^5 + 1\,036\,800\,000\,\rho^4}{331\,776}$$

Derivative

$$\frac{\partial}{\partial\theta}\left(-i\,\rho + \theta\,\rho + \frac{1}{2}\,i\,\theta^2\,\rho - \frac{\theta^3\,\rho}{6} - \frac{1}{24}\,i\,\theta^4\,\rho + \theta^5\right) = 5\,\theta^4 - \frac{1}{6}\,i\,\theta^3\,\rho - \frac{\theta^2\,\rho}{2} + i\,\theta\,\rho + \rho$$

Indefinite integral

$$\int\left(\theta^5 - i\,\rho + \theta\,\rho + \frac{1}{2}\,i\,\theta^2\,\rho - \frac{\theta^3\,\rho}{6} - \frac{1}{24}\,i\,\theta^4\,\rho\right)d\theta =$$
$$\frac{\theta^6}{6} - \frac{1}{120}\,i\,\theta^5\,\rho - \frac{\theta^4\,\rho}{24} + \frac{1}{6}\,i\,\theta^3\,\rho + \frac{\theta^2\,\rho}{2} - i\,\theta\,\rho + \text{constant}$$

Definite integral over a square of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\left(\theta^5 - i\,\rho + \theta\,\rho + \frac{1}{2}\,i\,\theta^2\,\rho - \frac{\theta^3\,\rho}{6} - \frac{1}{24}\,i\,\theta^4\,\rho\right)d\rho\,d\theta = 0$$

Definite integral over a disk of radius R

$$\iint_{\theta^2+\rho^2<R^2} \left(\theta^5 - \frac{1}{24} i \theta^4 \rho - \frac{\theta^3 \rho}{6} + \frac{1}{2} i \theta^2 \rho + \theta \rho - i \rho\right) d\theta \, d\rho = 0$$

From the indefinite integral result

$$\int \left(\theta^5 - i \rho + \theta \rho + \frac{1}{2} i \theta^2 \rho - \frac{\theta^3 \rho}{6} - \frac{1}{24} i \theta^4 \rho\right) d\theta =$$
$$\frac{\theta^6}{6} - \frac{1}{120} i \theta^5 \rho - \frac{\theta^4 \rho}{24} + \frac{1}{6} i \theta^3 \rho + \frac{\theta^2 \rho}{2} - i \theta \rho + \text{constant}$$

we obtain:

θ^6/6 - i θ ρ + (θ^2 ρ)/2 + 1/6 i θ^3 ρ - (θ^4 ρ)/24 - 1/120 i θ^5 ρ

Input

$$\frac{\theta^6}{6} - i \theta \rho + \frac{1}{2} (\theta^2 \rho) + \frac{1}{6} i \theta^3 \rho - \frac{1}{24} (\theta^4 \rho) - \frac{1}{120} i \theta^5 \rho$$

i is the imaginary unit

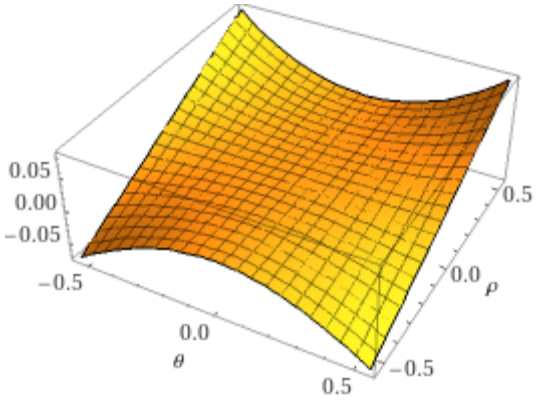
Result

$$\frac{\theta^6}{6} - \frac{1}{120} i \theta^5 \rho - \frac{\theta^4 \rho}{24} + \frac{1}{6} i \theta^3 \rho + \frac{\theta^2 \rho}{2} - i \theta \rho$$

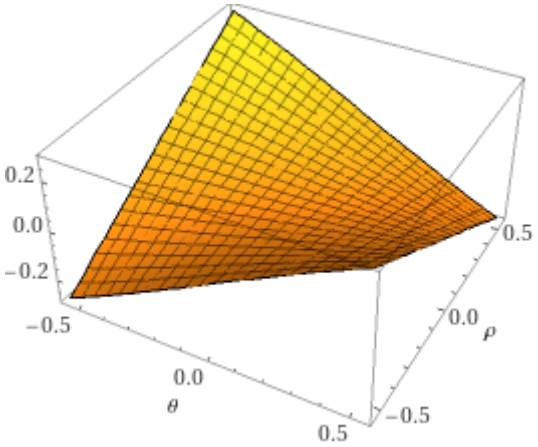
3D plots

Real part **(figures that can be related to the D-branes/Instantons)**

The key observation from the below plots and is that at $\theta = 1$, which is taken as the energy density of the universe at the Big Bang, with $\rho = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.

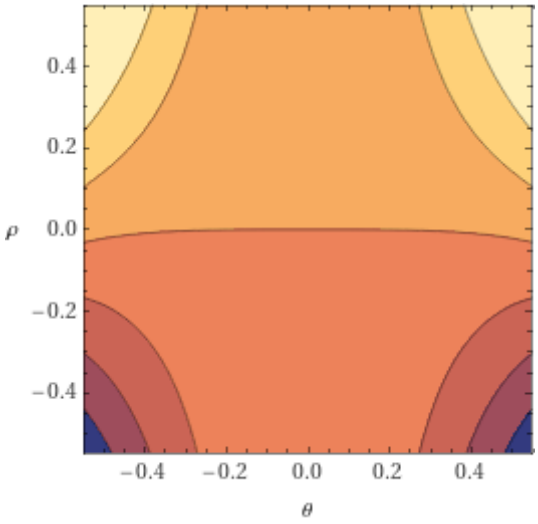


Imaginary part

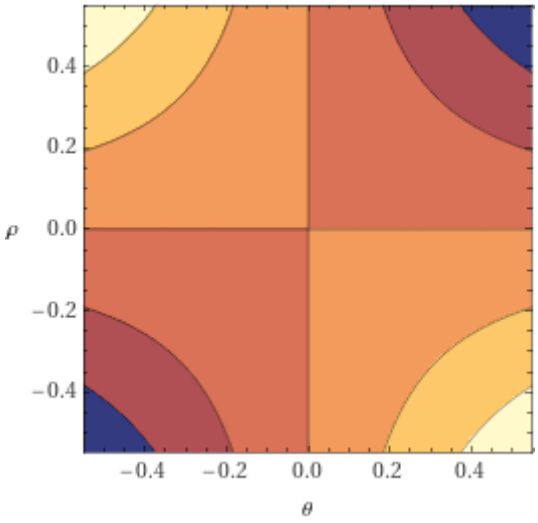


Contour plots

Real part



Imaginary part



Alternate forms

$$\frac{1}{120}\,\theta\left(20\,\theta^5 - i\,\theta^4\,\rho - 5\,\theta^3\,\rho + i\,20\,\theta^2\,\rho + 60\,\theta\,\rho - 120\,i\,\rho\right)$$

$$\frac{\theta^6}{6} + \frac{1}{120}\left(\theta\left(60 - i\,\theta\left(-20 + \theta\left(\theta - 5\,i\right)\right)\right) - 120\,i\right)\theta\,\rho$$

$$\frac{\theta^6}{6} + \left(\theta\left(\frac{1}{2} + \theta\left(\left(-\frac{1}{24} - \frac{i\,\theta}{120}\right)\theta + \frac{i}{6}\right)\right) - i\right)\theta\,\rho$$

Alternate form assuming θ and ρ are real

$$\frac{1}{24}\left(4\,\theta^6 - \theta^4\,\rho + 12\,\theta^2\,\rho\right) - \frac{1}{120}\,i\,\theta\left(\theta^4 - 20\,\theta^2 + 120\right)\rho$$

Roots

$$\theta^4 - 5\,i\,\theta^3 - 20\,\theta^2 + 60\,i\,\theta + 120 \neq 0\,, \quad \rho = -\frac{20\,i\,\theta^5}{\theta^4 - 5\,i\,\theta^3 - 20\,\theta^2 + 60\,i\,\theta + 120}$$

$$\theta = 0$$

Polynomial discriminant

$$\Delta_\theta = -\frac{1}{1\,791\,590\,400\,000}\rho\left(3487\,\rho^9 - 2\,363\,600\,\rho^8 + 632\,160\,000\,\rho^7 - 80\,524\,800\,000\,\rho^6 + 4\,320\,000\,000\,000\,\rho^5\right)$$

Derivative

$$\frac{\partial}{\partial\theta}\left(\frac{\theta^6}{6} - i\,\theta\,\rho + \frac{\theta^2\,\rho}{2} + \frac{1}{6}\,i\,\theta^3\,\rho - \frac{\theta^4\,\rho}{24} - \frac{1}{120}\,i\,\theta^5\,\rho\right) = \theta^5 - \frac{1}{24}\,i\,\theta^4\,\rho - \frac{\theta^3\,\rho}{6} + \frac{1}{2}\,i\,\theta^2\,\rho + \theta\,\rho - i\,\rho$$

Indefinite integral

$$\int\left(\frac{\theta^6}{6} - i\,\theta\,\rho + \frac{\theta^2\,\rho}{2} + \frac{1}{6}\,i\,\theta^3\,\rho - \frac{\theta^4\,\rho}{24} - \frac{1}{120}\,i\,\theta^5\,\rho\right)d\theta =$$
$$\frac{\theta^7}{42} - \frac{1}{720}\,i\,\theta^6\,\rho - \frac{\theta^5\,\rho}{120} + \frac{1}{24}\,i\,\theta^4\,\rho + \frac{\theta^3\,\rho}{6} - \frac{1}{2}\,i\,\theta^2\,\rho + \text{constant}$$

Definite integral over a square of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\left(\frac{\theta^6}{6} - i\,\theta\,\rho + \frac{\theta^2\,\rho}{2} + \frac{1}{6}\,i\,\theta^3\,\rho - \frac{\theta^4\,\rho}{24} - \frac{1}{120}\,i\,\theta^5\,\rho\right)d\rho\,d\theta = \frac{2\,L^8}{21}$$

From the following alternate form

$$\frac{1}{24}\left(4\,\theta^6 - \theta^4\,\rho + 12\,\theta^2\,\rho\right) - \frac{1}{120}\,i\,\theta\left(\theta^4 - 20\,\theta^2 + 120\right)\rho$$

-1/120 i θ (120 - 20 θ^2 + θ^4) ρ + 1/24 (4 θ^6 + 12 θ^2 ρ - θ^4 ρ)

for θ = 0.4 and ρ = 0.2:

-1/120 i 0.4 (120 - 20 0.4^2 + 0.4^4) 0.2 + 1/24 (4 0.4^6 + 12 0.4^2 0.2 – 0.4^4 0.2)

Input

$$-\frac{1}{120}\,i\times 0.4\left(120 - 20\times 0.4^2 + 0.4^4\right)\times 0.2 + \frac{1}{24}\left(4\times 0.4^6 + 12\times 0.4^2\times 0.2 - 0.4^4\times 0.2\right)$$

i is the imaginary unit

Result

0.0164693… –
0.0778837… i

Alternate complex forms

$0.079606\,(\cos(-1.36241) + i\sin(-1.36241))$

$0.079606\,e^{-1.36241\,i}$

Polar coordinates

$r = 0.079606$ (radius), $\theta = -1.36241$ (angle)

0.079606

From which, after some calculations:

1/4(1/((-1/120 i 0.4 (120 - 20 0.4^2 + 0.4^4) 0.2 + 1/24 (4 0.4^6 + 12 0.4^2 0.2 - 0.4^4 0.2))))

Input

$$\frac{1}{4}\times 1\Big/\left(-\frac{1}{120}\,i\times 0.4\left(120-20\times 0.4^2+0.4^4\right)\times 0.2+\frac{1}{24}\left(4\times 0.4^6+12\times 0.4^2\times 0.2-0.4^4\times 0.2\right)\right)$$

i is the imaginary unit

Result

0.649717… +
3.07252… i

Alternate complex forms

$3.14047\,(\cos(1.36241) + i\sin(1.36241))$

$3.14047\,e^{1.36241\,i}$

Polar coordinates

$r = 3.14047$ (radius), $\theta = 1.36241$ (angle)

3.14047 ≈ π (Ramanujan Recurring Number)

And again:

1/6(1/4(1/((-1/120 i 0.4 (120 - 20 0.4^2 + 0.4^4) 0.2 + 1/24 (4 0.4^6 + 12 0.4^2 0.2 - 0.4^4 0.2)))))^2

Input

$$\frac{1}{6}\left(\frac{1}{4}\times 1\Big/\left(-\frac{1}{120}\,i\times 0.4\left(120-20\times 0.4^2+0.4^4\right)\times 0.2+\frac{1}{24}\left(4\times 0.4^6+12\times 0.4^2\times 0.2-0.4^4\times 0.2\right)\right)\right)^2$$

i is the imaginary unit

Result

$$-1.50304\ldots + 0.665424\ldots\, i$$

Alternate complex forms

$$-1.50304 + 0.665424\, i$$

$$1.64376\,(\cos(2.72481) + i\sin(2.72481))$$

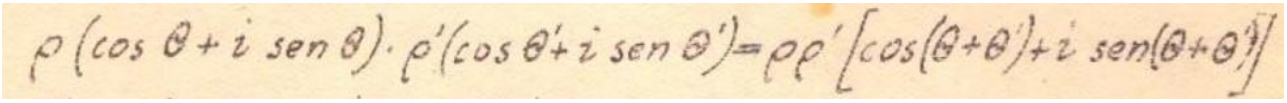
$$1.64376\, e^{2.72481\, i}$$

Polar coordinates

$r = 1.64376$ (radius), $\theta = 2.72481$ (angle)

1.64376 ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Now, we analyze the following equation:



We consider:

ρ*ρ_1*[cos(θ+θ_1)+i sin(θ+θ_1)]

Input

$\rho\, \rho_1\, (\cos(\theta + \theta_1) + i \sin(\theta + \theta_1))$

ρ_n is the nontrivial n^{th} zero of the Riemann zeta function

i is the imaginary unit

Expanded trigonometric form

$\rho \cos(\theta) \cos(\theta_1) \rho_1 + \rho\, i \cos(\theta_1) \sin(\theta) \rho_1 + \rho\, i \cos(\theta) \sin(\theta_1) \rho_1 + \rho\, (-1) \sin(\theta) \sin(\theta_1)$

ρ_1

Reduced trigonometric form

$\rho\, \rho_1 \cos(\theta + \theta_1) + i\, \rho\, \rho_1 \sin(\theta + \theta_1)$

Alternate forms

$e^{i\,\theta + i\,\theta_1}\, \rho\, \rho_1$

$\rho\, (\rho_1 \cos(\theta + \theta_1) + i\, \rho_1 \sin(\theta + \theta_1))$

Root

$\rho = 0$

Property as a function

Parity

odd

Series expansion at θ=0

$$\rho\,\rho_1\,(\cos(\theta_1) + i\sin(\theta_1)) + i\,\theta\,\rho\,\rho_1\,(\cos(\theta_1) + i\sin(\theta_1)) - \frac{1}{2}\theta^2\,(\rho\,\rho_1\,(\cos(\theta_1) + i\sin(\theta_1))) + \frac{1}{6}\theta^3\,\rho\,\rho_1\,(\sin(\theta_1) - i\cos(\theta_1)) + \frac{1}{24}\theta^4\,\rho\,\rho_1\,(\cos(\theta_1) + i\sin(\theta_1)) + O\left(\theta^5\right)$$

(Taylor series)

Derivative

$$\frac{\partial}{\partial\theta}(\rho\,\rho_1\,(\cos(\theta + \theta_1) + i\sin(\theta + \theta_1))) = i\,\rho\,\rho_1\,(\cos(\theta + \theta_1) + i\sin(\theta + \theta_1))$$

Indefinite integral

$$\int \rho\,\rho_1\,(\cos(\theta + \theta_1) + i\sin(\theta + \theta_1))\,d\theta = \rho\,\rho_1\,(\sin(\theta + \theta_1) - i\cos(\theta + \theta_1)) + \text{constant}$$

Addition formulas

$$\rho\,\rho_1\,(\cos(\theta + \theta_1) + i\sin(\theta + \theta_1)) = \rho\,(\cos(\theta)\cos(\theta_1) - \sin(\theta)\sin(\theta_1) + i\,(\cos(\theta_1)\sin(\theta) + \cos(\theta)\sin(\theta_1)))\,\rho_1$$

$$\rho\,\rho_1\,(\cos(\theta + \theta_1) + i\sin(\theta + \theta_1)) = \rho\,(\cos(\theta + \theta_1) + i\,(\cos(\theta_1)\sin(\theta) + \cos(\theta)\sin(\theta_1)))\,\rho_1$$

$$\rho\,\rho_1\,(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1)) = \rho\,(\cos(\theta)\cos(\theta_1)-\sin(\theta)\sin(\theta_1)+i\sin(\theta+\theta_1))\,\rho_1$$

Alternative representations

$$\rho\,\rho_1\,(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1)) = \rho\left(\cosh(-i\,(\theta+\theta_1))-i\cos\left(\frac{\pi}{2}+\theta+\theta_1\right)\right)\rho_1$$

$$\rho\,\rho_1\,(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1)) = \rho\left(\cosh(i\,(\theta+\theta_1))+i\cos\left(\frac{\pi}{2}-\theta-\theta_1\right)\right)\rho_1$$

$$\rho\,\rho_1\,(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1)) = \rho\left(\cosh(i\,(\theta+\theta_1))+\frac{i\left(-e^{-i\,(\theta+\theta_1)}+e^{i\,(\theta+\theta_1)}\right)}{2\,i}\right)\rho_1$$

$\cosh(x)$ is the hyperbolic cosine function

Series representations

$$\rho\,\rho_1\,(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1)) = \sum_{k=0}^{\infty}\frac{(-1)^k\left((\theta+\theta_1)^{2k}+i\left(-\frac{\pi}{2}+\theta+\theta_1\right)^{2k}\right)\rho\,\rho_1}{(2\,k)!}$$

$$\rho\,\rho_1\,(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1)) = \sum_{k=0}^{\infty}\frac{(-1)^k\,(\theta+\theta_1)^{2k}\,\rho\,(i\,(\theta+\theta_1)\,(2\,k)!+(1+2\,k)!)\,\rho_1}{(2\,k)!\,(1+2\,k)!}$$

$$\rho\,\rho_1\,(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1)) = \sum_{k=0}^{\infty}\frac{(-1)^k\left(i\,(\theta+\theta_1)^{1+2k}-\left(-\frac{\pi}{2}+\theta+\theta_1\right)^{1+2k}\right)\rho\,\rho_1}{(1+2\,k)!}$$

$n!$ is the factorial function

Integral representations

$$\rho\,\rho_1\,(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1)) = \frac{\rho\,\rho_1}{4\sqrt{\pi}}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{s-(\theta+\theta_1)^2/(4s)}\,(-2is+\theta+\theta_1)}{s^{3/2}}\,ds \quad \text{for } \gamma>0$$

$$\rho\,\rho_1\,(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1)) = \frac{2\sqrt{\pi}\int_0^1 i\,(\theta+\theta_1)\,\rho\cos(t\,(\theta+\theta_1))\,\rho_1\,dt - i\,\rho\,\rho_1\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{s-(\theta+\theta_1)^2/(4s)}}{\sqrt{s}}\,ds}{2\sqrt{\pi}} \quad \text{for } \gamma>0$$

$$\rho\,\rho_1\,(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1)) = \frac{\rho\,\rho_1}{4\sqrt{\pi}}\int_{-i\infty+\gamma}^{i\infty+\gamma}\left(\frac{e^{s-(\theta+\theta_1)^2/(4s)}\,(\theta+\theta_1)}{s^{3/2}}-\frac{i\,2^{1+2s}\,(\theta+\theta_1)^{-2s}\,\Gamma(s)}{\Gamma\left(\frac{1}{2}-s\right)}\right)ds \quad \text{for } \left(0<\gamma<\frac{1}{2}\text{ and }\theta+\theta_1>0\right)$$

$\Gamma(x)$ is the gamma function

From the indefinite integral result

$$\int\rho\,\rho_1\,(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\,d\theta = \rho\,\rho_1\,(\sin(\theta+\theta_1)-i\cos(\theta+\theta_1)) + \text{constant}$$

we obtain:

ρ (-i cos(θ + θ_1) + sin(θ + θ_1)) ZetaZero(1)

Input

$$\rho\,(-i\cos(\theta+\theta_1)+\sin(\theta+\theta_1))\,\rho_1$$

ρ_n is the nontrivial n^{th} zero of the Riemann zeta function

i is the imaginary unit

Expanded form

$\rho\,\rho_1\,\sin(\theta+\theta_1) - i\,\rho\,\rho_1\,\cos(\theta+\theta_1)$

Expanded trigonometric form

$\rho\,(-1)\,i\,\cos(\theta)\,\cos(\theta_1)\,\rho_1 + \rho\,\cos(\theta_1)\,\sin(\theta)\,\rho_1 + \rho\,\cos(\theta)\,\sin(\theta_1)\,\rho_1 + \rho\,i\,\sin(\theta)\,\sin(\theta_1)$
ρ_1

Reduced trigonometric form

$-i\,(\rho\,\rho_1\,\cos(\theta+\theta_1) + i\,\rho\,\rho_1\,\sin(\theta+\theta_1))$

Alternate forms

$-i\,e^{i\,\theta+i\,\theta_1}\,\rho\,\rho_1$

$-i\,\rho\,\rho_1\,(\cos(\theta+\theta_1) + i\,\sin(\theta+\theta_1))$

$\rho\,(\rho_1\,\sin(\theta+\theta_1) - i\,\rho_1\,\cos(\theta+\theta_1))$

Root

$\rho = 0$

Property as a function

Parity

odd

Series expansion at θ=0

$$\rho\,\rho_1\,(\sin(\theta_1) - i\cos(\theta_1)) + \theta\,\rho\,\rho_1\,(\cos(\theta_1) + i\sin(\theta_1)) + \frac{1}{2}i\,\theta^2\,\rho\,\rho_1\,(\cos(\theta_1) + i\sin(\theta_1)) - \frac{1}{6}\theta^3\,(\rho\,\rho_1\,(\cos(\theta_1) + i\sin(\theta_1))) + \frac{1}{24}\theta^4\,\rho\,\rho_1\,(\sin(\theta_1) - i\cos(\theta_1)) + O\left(\theta^5\right)$$

(Taylor series)

Derivative

$$\frac{\partial}{\partial\theta}(\rho\,(-i\cos(\theta+\theta_1) + \sin(\theta+\theta_1))\,\rho_1) = \rho\,\rho_1\,(\cos(\theta+\theta_1) + i\sin(\theta+\theta_1))$$

Indefinite integral

$$\int \rho\,(-i\cos(\theta+\theta_1) + \sin(\theta+\theta_1))\,\rho_1\,d\theta = -\rho\,\rho_1\,(\cos(\theta+\theta_1) + i\sin(\theta+\theta_1)) + \text{constant}$$

Addition formulas

$$\rho\,(-i\cos(\theta+\theta_1) + \sin(\theta+\theta_1))\,\rho_1 = \rho\,(\cos(\theta_1)\sin(\theta) + \cos(\theta)\sin(\theta_1) - i\,(\cos(\theta)\cos(\theta_1) - \sin(\theta)\sin(\theta_1)))\,\rho_1$$

$$\rho\,(-i\cos(\theta+\theta_1) + \sin(\theta+\theta_1))\,\rho_1 = \rho\,(-i\cos(\theta+\theta_1) + \cos(\theta_1)\sin(\theta) + \cos(\theta)\sin(\theta_1))\,\rho_1$$

$$\rho\,(-i\cos(\theta+\theta_1) + \sin(\theta+\theta_1))\,\rho_1 = \rho\,(-i\,(\cos(\theta)\cos(\theta_1) - \sin(\theta)\sin(\theta_1)) + \sin(\theta+\theta_1))\,\rho_1$$

Alternative representations

$$\rho\,(-i\cos(\theta+\theta_1)+\sin(\theta+\theta_1))\,\rho_1 = \rho\left(-i\cosh(-i\,(\theta+\theta_1))-\cos\left(\frac{\pi}{2}+\theta+\theta_1\right)\right)\rho_1$$

$$\rho\,(-i\cos(\theta+\theta_1)+\sin(\theta+\theta_1))\,\rho_1 = \rho\left(-i\cosh(i\,(\theta+\theta_1))+\cos\left(\frac{\pi}{2}-\theta-\theta_1\right)\right)\rho_1$$

$$\rho\,(-i\cos(\theta+\theta_1)+\sin(\theta+\theta_1))\,\rho_1 = \rho\left(-i\cosh(-i\,(\theta+\theta_1))+\cos\left(\frac{\pi}{2}-\theta-\theta_1\right)\right)\rho_1$$

$\cosh(x)$ is the hyperbolic cosine function

Series representations

$$\rho\,(-i\cos(\theta+\theta_1)+\sin(\theta+\theta_1))\,\rho_1 = \sum_{k=0}^{\infty}\frac{(-1)^k\left(-i\,(\theta+\theta_1)^{2k}+\left(-\frac{\pi}{2}+\theta+\theta_1\right)^{2k}\right)\rho\,\rho_1}{(2k)!}$$

$$\rho\,(-i\cos(\theta+\theta_1)+\sin(\theta+\theta_1))\,\rho_1 = \sum_{k=0}^{\infty}\frac{(-1)^k\,(\theta+\theta_1)^{2k}\,\rho\,((\theta+\theta_1)\,(2k)!-i\,(1+2k)!)\,\rho_1}{(2k)!\,(1+2k)!}$$

$$\rho\,(-i\cos(\theta+\theta_1)+\sin(\theta+\theta_1))\,\rho_1 = \sum_{k=0}^{\infty}\frac{(-1)^k\left((\theta+\theta_1)^{1+2k}+i\left(-\frac{\pi}{2}+\theta+\theta_1\right)^{1+2k}\right)\rho\,\rho_1}{(1+2k)!}$$

$n!$ is the factorial function

Integral representations

$$\rho\,(-i\cos(\theta+\theta_1)+\sin(\theta+\theta_1))\,\rho_1 = -\frac{i\,\rho\,\rho_1}{4\sqrt{\pi}}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{s-(\theta+\theta_1)^2/(4s)}\,(-2is+\theta+\theta_1)}{s^{3/2}}\,ds \quad \text{for } \gamma>0$$

$$\rho\,(-i\cos(\theta+\theta_1)+\sin(\theta+\theta_1))\,\rho_1 = \frac{2\sqrt{\pi}\int_0^1(\theta+\theta_1)\,\rho\cos(t\,(\theta+\theta_1))\,\rho_1\,dt-\rho\,\rho_1\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{s-(\theta+\theta_1)^2/(4\,s)}}{\sqrt{s}}\,ds}{2\sqrt{\pi}} \quad \text{for } \gamma>0$$

$$\rho\,(-i\cos(\theta+\theta_1)+\sin(\theta+\theta_1))\,\rho_1 = \int_{-i\infty+\gamma}^{i\infty+\gamma}\left(-\frac{e^{s-(\theta+\theta_1)^2/(4\,s)}\,\rho\,\rho_1}{2\sqrt{\pi}\,\sqrt{s}}-\frac{i\,2^{-2+2\,s}\,(\theta+\theta_1)^{1-2\,s}\,\rho\,\Gamma(s)\,\rho_1}{\sqrt{\pi}\,\Gamma\left(\frac{3}{2}-s\right)}\right)ds$$

for $(0<\gamma<1$ and $\theta+\theta_1>0)$

From the indefinite integral result

$$\int\rho\,(-i\cos(\theta+\theta_1)+\sin(\theta+\theta_1))\,\rho_1\,d\theta = -\rho\,\rho_1\,(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))+\text{constant}$$

we obtain:

-ρ (cos(θ + θ_1) + i sin(θ + θ_1)) ZetaZero(1)

Input

$$-\rho\,(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\,\rho_1$$

ρ_n is the nontrivial n^{th} zero of the Riemann zeta function

i is the imaginary unit

Expanded trigonometric form

$$-\rho\cos(\theta)\cos(\theta_1)\,\rho_1-\rho\,i\cos(\theta_1)\sin(\theta)\,\rho_1-\rho\,i\cos(\theta)\sin(\theta_1)\,\rho_1+\rho\sin(\theta)\sin(\theta_1)\,\rho_1$$

Reduced trigonometric form

$$-\rho\,\rho_1\cos(\theta+\theta_1)-i\,\rho\,\rho_1\sin(\theta+\theta_1)$$

Alternate forms

$$-e^{i\theta+i\theta_1}\rho\rho_1$$

$$\rho(-\rho_1\cos(\theta+\theta_1)-i\rho_1\sin(\theta+\theta_1))$$

Root

$$\rho=0$$

Property as a function

Parity

odd

Series expansion at θ=0

$$-\rho\rho_1(\cos(\theta_1)+i\sin(\theta_1))+\theta\rho\rho_1(\sin(\theta_1)-i\cos(\theta_1))+\frac{1}{2}\theta^2\rho\rho_1(\cos(\theta_1)+i\sin(\theta_1))+\frac{1}{6}i\theta^3\rho\rho_1(\cos(\theta_1)+i\sin(\theta_1))-\frac{1}{24}\theta^4(\rho\rho_1(\cos(\theta_1)+i\sin(\theta_1)))+O\left(\theta^5\right)$$

(Taylor series)

Derivative

$$\frac{\partial}{\partial\theta}(-\rho(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)=\rho\rho_1(\sin(\theta+\theta_1)-i\cos(\theta+\theta_1))$$

Indefinite integral

$$\int-\rho(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1\,d\theta=i\rho\rho_1(\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))+\text{constant}$$

Addition formulas

$$((\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)(-1)\rho = -\rho(\cos(\theta)\cos(\theta_1)-\sin(\theta)\sin(\theta_1)+i(\cos(\theta_1)\sin(\theta)+\cos(\theta)\sin(\theta_1)))\rho_1$$

$$((\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)(-1)\rho = -\rho(\cos(\theta+\theta_1)+i(\cos(\theta_1)\sin(\theta)+\cos(\theta)\sin(\theta_1)))\rho_1$$

$$((\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)(-1)\rho = -\rho(\cos(\theta)\cos(\theta_1)-\sin(\theta)\sin(\theta_1)+i\sin(\theta+\theta_1))\rho_1$$

Alternative representations

$$((\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)(-1)\rho = -\rho\left(\cosh(-i(\theta+\theta_1))-i\cos\left(\frac{\pi}{2}+\theta+\theta_1\right)\right)\rho_1$$

$$((\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)(-1)\rho = -\rho\left(\cosh(i(\theta+\theta_1))+i\cos\left(\frac{\pi}{2}-\theta-\theta_1\right)\right)\rho_1$$

$$((\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)(-1)\rho = -\rho\left(\cosh(i(\theta+\theta_1))+\frac{i\left(-e^{-i(\theta+\theta_1)}+e^{i(\theta+\theta_1)}\right)}{2i}\right)\rho_1$$

cosh(x) is the hyperbolic cosine function

Series representations

$$((\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)(-1)\rho = \sum_{k=0}^{\infty}\frac{(-1)^{1+k}\left((\theta+\theta_1)^{2k}+i\left(-\frac{\pi}{2}+\theta+\theta_1\right)^{2k}\right)\rho\,\rho_1}{(2k)!}$$

$$((\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)(-1)\rho = \sum_{k=0}^{\infty}(-1)^k(\theta+\theta_1)^{2k}\rho\left(-\frac{1}{(2k)!}-\frac{i(\theta+\theta_1)}{(1+2k)!}\right)\rho_1$$

$$((\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)(-1)\rho = \sum_{k=0}^{\infty}\frac{(-1)^k\left(-i(\theta+\theta_1)^{1+2k}+\left(-\frac{\pi}{2}+\theta+\theta_1\right)^{1+2k}\right)\rho\rho_1}{(1+2k)!}$$

$n!$ is the factorial function

Integral representations

$$((\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)(-1)\rho = -\frac{\rho\rho_1}{4\sqrt{\pi}}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{s-(\theta+\theta_1)^2/(4s)}(-2is+\theta+\theta_1)}{s^{3/2}}ds \quad \text{for } \gamma>0$$

$$((\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)(-1)\rho = \frac{2\sqrt{\pi}\int_0^1 -i(\theta+\theta_1)\rho\cos(t(\theta+\theta_1))\rho_1\,dt + i\rho\rho_1\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{s-(\theta+\theta_1)^2/(4s)}}{\sqrt{s}}ds}{2\sqrt{\pi}} \quad \text{for } \gamma>0$$

$$((\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)(-1)\rho = -\frac{\rho\rho_1}{4\sqrt{\pi}}\int_{-i\infty+\gamma}^{i\infty+\gamma}\left(\frac{e^{s-(\theta+\theta_1)^2/(4s)}(\theta+\theta_1)}{s^{3/2}}-\frac{i2^{1+2s}(\theta+\theta_1)^{-2s}\Gamma(s)}{\Gamma\left(\frac{1}{2}-s\right)}\right)ds \quad \text{for } \left(0<\gamma<\frac{1}{2} \text{ and } \theta+\theta_1>0\right)$$

$\Gamma(x)$ is the gamma function

From the alternative representation

$$((\cos(\theta+\theta_1)+i\sin(\theta+\theta_1))\rho_1)(-1)\rho = -\rho\left(\cosh(i(\theta+\theta_1))+i\cos\left(\frac{\pi}{2}-\theta-\theta_1\right)\right)\rho_1$$

-ρ (cosh(i (θ + θ_1)) + i cos(π/2 - θ - θ_1)) ρ_1

for $\rho = 0.2$, $\rho_1 = 0.4$, $\theta = 0.8$ and $\theta_1 = 0.16$:

-0.2 (cosh(i (0.8 + 0.16)) + i cos(π/2 – 0.8 – 0.16)) 0.4

Input

$$-0.2\left(\cosh(i(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)\times 0.4$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Result

$$-0.0458816\ldots - 0.0655353\ldots\, i$$

Alternate complex forms

$$0.08\,(\cos(-2.18159)+i\sin(-2.18159))$$

$$0.08\,e^{-2.18159\,i}$$

Polar coordinates

$r = 0.08$ (radius), $\theta = -2.18159$ (angle)

0.08

Addition formulas

$$-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)0.4=$$
$$-0.08\left(\cosh(0.96\,i)+i\cos(-0.96)\cos\left(\frac{\pi}{2}\right)-i\left(\sin(-0.96)\sin\left(\frac{\pi}{2}\right)\right)\right)$$

$$-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)0.4=$$
$$-0.08\left(\cosh(0.96\,i)+i\cos(-0.96)\cos\left(-\frac{\pi}{2}\right)+i\sin(-0.96)\sin\left(-\frac{\pi}{2}\right)\right)$$

$$-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)0.4=$$
$$-0.08\left(\cosh(0.96\,i)+i\cosh\left(\frac{i\,\pi}{2}\right)\cos(-0.96)+i\,\mathcal{A}\sinh\left(\frac{i\,\pi}{2}\right)\sin(-0.96)\right)$$

$$-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)0.4=$$
$$-0.08\left(\cosh(0.96\,i)+i\cosh\left(-\frac{i\,\pi}{2}\right)\cos(-0.96)-i\left(\mathcal{A}\sinh\left(-\frac{i\,\pi}{2}\right)\sin(-0.96)\right)\right)$$

sinh(x) is the hyperbolic sine function

Alternative representations

$$-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)0.4=$$
$$-0.08\left(i\cosh\left(-i\left(-0.96+\frac{\pi}{2}\right)\right)+\cos\left(0.96\,i^2\right)\right)$$

$$-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)0.4=$$
$$-0.08\left(i\cosh\left(i\left(-0.96+\frac{\pi}{2}\right)\right)+\cos((-0.96\,i)\,i)\right)$$

$$-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)0.4=$$
$$-0.08\left(i\cosh\left(i\left(-0.96+\frac{\pi}{2}\right)\right)+\frac{1}{2}\left(e^{-0.96\,i}+e^{0.96\,i}\right)\right)$$

Series representations

$$-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)0.4=$$
$$\sum_{k=0}^{\infty}\frac{e^{-0.081644\,k}\left(-0.08\,i^{2k}-0.08\,(-1)^k\,e^{-1.30465\,k}\,i\,(-1.92+\pi)^{2k}\right)}{(2\,k)!}$$

$$-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)0.4=$$
$$\sum_{k=0}^{\infty}\left(-\frac{0.08\,(-1)^k\,i\left(-0.96+\frac{\pi}{2}\right)^{2k}}{(2\,k)!}-\frac{0.08\,\mathcal{A}\left(0.96\,i-\frac{\pi\,\mathcal{A}}{2}\right)^{1+2k}}{(1+2\,k)!}\right)$$

$$-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)0.4=$$
$$-0.08\left(I_0(0.96\,i)+2\sum_{k=1}^{\infty}I_{2\,k}(0.96\,i)+i\sum_{k=0}^{\infty}\frac{(-1)^k\left(-0.96+\frac{\pi}{2}\right)^{2k}}{(2\,k)!}\right)$$

$n!$ is the factorial function

$I_n(z)$ is the modified Bessel function of the first kind

Integral representations

$$-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)0.4=$$
$$-0.08+\int_0^1(-0.0768\,i\sinh(0.96\,i\,t)-0.0768\,i\sin(0+0.5\,\pi-0.96\,t))\,dt$$

$$-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)0.4=-0.08-0.08\,i+$$
$$\int_0^1(-0.0768\,i\sinh(0.96\,i\,t)+i\,(-0.0768+0.04\,\pi)\sin(0.5\,(-1.92+\pi)\,t))\,dt$$

$$-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)0.4=\int_{\frac{\pi\,\mathcal{A}}{2}}^{0.96\,i}\frac{(-0.08\,i+0.0416667\,\pi\,\mathcal{A})\sinh(t)-0.08\,i\sin\left(\frac{0+0.5\,i\,\pi-t+0.5\,\pi\,\mathcal{A}-0.260417\,\pi^2\,\mathcal{A}}{i-0.520833\,\pi\,\mathcal{A}}\right)}{i-0.520833\,\pi\,\mathcal{A}}\,dt$$

From which:

(10^2(-0.2 (cosh(i (0.8 + 0.16)) + i cos(π/2 – 0.8 – 0.16)) 0.4))^4

Input

$$\left(10^2\left(-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)\times 0.4\right)\right)^4$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Result

$$-3136.99\ldots-2633.72\ldots\,i$$

Alternate complex forms

$$-3136.99-2633.72\,i$$

$$4096.\,(\cos(-2.44319)+i\sin(-2.44319))$$

$$4096.\,e^{-2.44319\,i}$$

Polar coordinates

$r = 4096.$ (radius), $\theta = -2.44319$ (angle)

4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

27*sqrt((10^2(-0.2 (cosh(i (0.8 + 0.16)) + i cos(π/2 – 0.8 – 0.16)) 0.4))^4)+1-Φ*i

Input

$$27\sqrt{\left(10^2\left(-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)\times 0.4\right)\right)^4}+1-\Phi\,i$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Φ is the golden ratio conjugate

Result

592.235… −
1624.33… i

Alternate complex forms

$592.235 - 1624.33\,i$

$1728.92\,(\cos(-1.22117) + i\sin(-1.22117))$

$1728.92\,e^{-1.22117\,i}$

Polar coordinates

$r = 1728.92$ (radius), $\theta = -1.22117$ (angle)

1728.92

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string.

Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(27*sqrt((10^2(-0.2 (cosh(i (0.8 + 0.16)) + i cos(π/2 – 0.8 – 0.16)) 0.4))^4)+1-Φ*i)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{27\sqrt{\left(10^2\left(-0.2\left(\cosh(i\,(0.8+0.16))+i\cos\left(\frac{\pi}{2}-0.8-0.16\right)\right)\times 0.4\right)\right)^4}+1-\Phi\,i}+{C_{\text{MRB}}}^{1-1/(4\pi)+\pi}$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Φ is the golden ratio conjugate

C_{MRB} is the MRB constant

Result

$1.63949\ldots - 0.133677\ldots\, i$

Alternate complex forms

$1.63949 - 0.133677\, i$

$1.64493\,(\cos(-0.0813559) + i \sin(-0.0813559))$

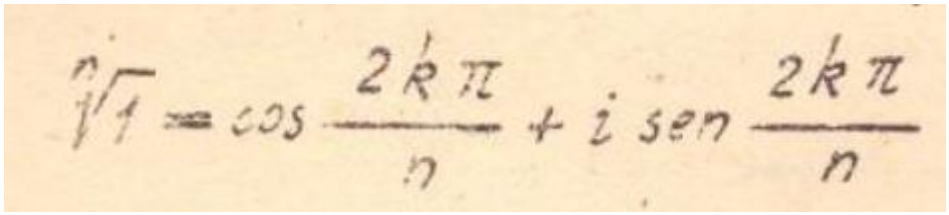
$1.64493\, e^{-0.0813559\, i}$

Polar coordinates

$r = 1.64493$ (radius), $\theta = -0.0813559$ (angle)

1.64493 ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Now, we analyze the following equation:



$$\sqrt[n]{1} = \cos\frac{2k\pi}{n} + i\,\mathrm{sen}\,\frac{2k\pi}{n}$$

We consider:

cos((2*k*Pi)/(n)) + i sin(((2*k*Pi)/(n)))

Input

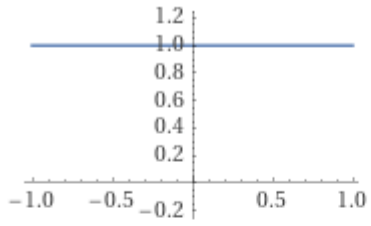
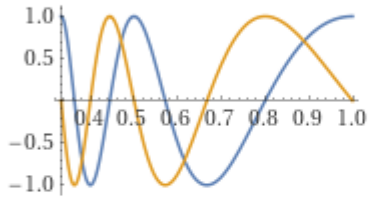
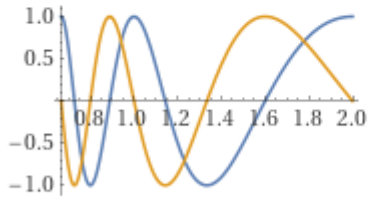
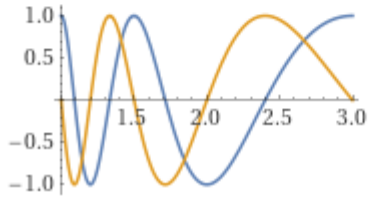
$$\cos\left(\frac{2k\pi}{n}\right) + i\sin\left(\frac{2k\pi}{n}\right)$$

i is the imaginary unit

Values

k	
0	1
1	$\cos\left(\frac{2\pi}{n}\right) + i\sin\left(\frac{2\pi}{n}\right)$
2	$\cos\left(\frac{4\pi}{n}\right) + i\sin\left(\frac{4\pi}{n}\right)$
3	$\cos\left(\frac{6\pi}{n}\right) + i\sin\left(\frac{6\pi}{n}\right)$

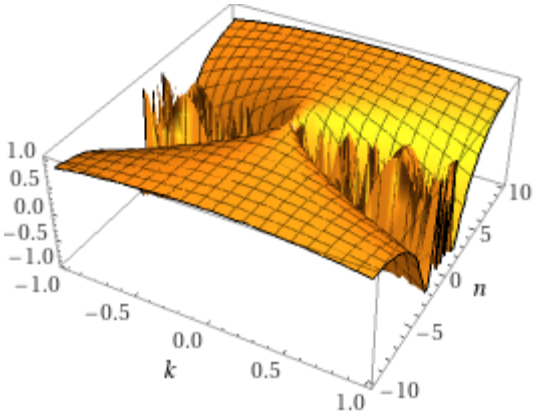
Plots **(figures that can be related to the open strings)**

k	
0	 (*n* from −1 to 1)
1	 (*n* from 0.3 to 1) real part imaginary part
2	 (*n* from 0.7 to 2) real part imaginary part
3	 (*n* from 1 to 3) real part imaginary part

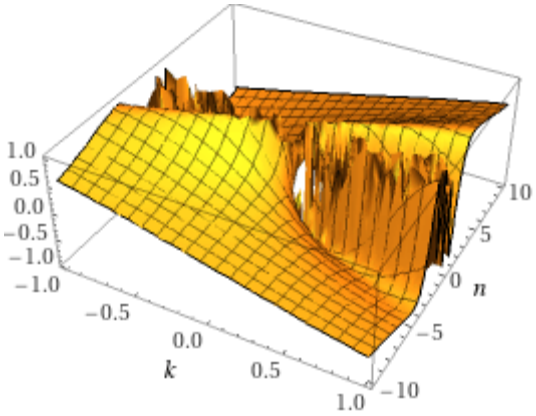
3D plots

Real part **(figures that can be related to the D-branes/Instantons)**

The key observation from the below plots and is that at $k = 1$, which is taken as the energy density of the universe at the Big Bang, with $n = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.

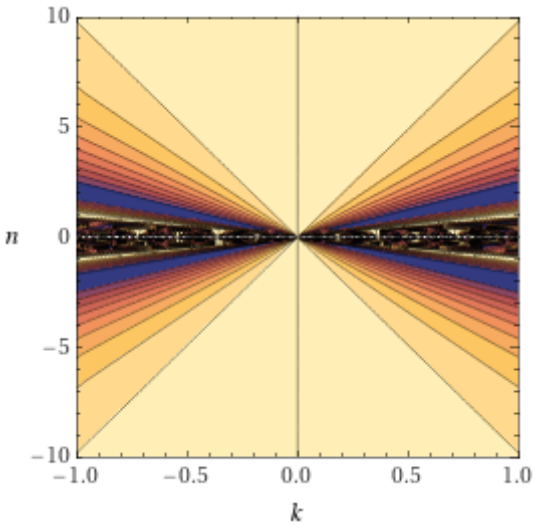


Imaginary part

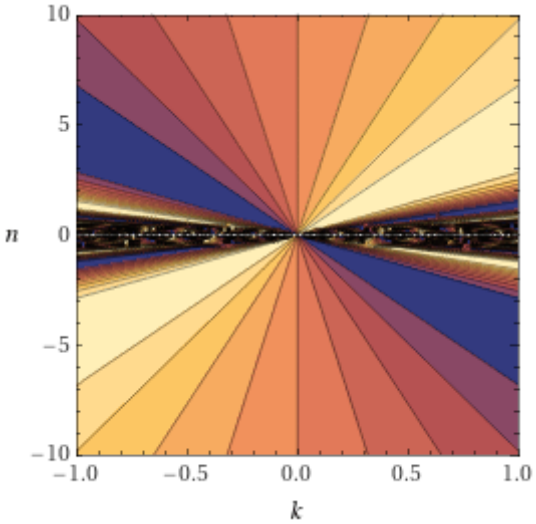


Contour plots

Real part



Imaginary part



Alternate form

$$e^{(2 i \pi k)/n}$$

Expanded trigonometric form

$$\cos^2\left(\frac{k\pi}{n}\right) - \sin^2\left(\frac{k\pi}{n}\right) + i\, 2\cos\left(\frac{k\pi}{n}\right)\sin\left(\frac{k\pi}{n}\right)$$

Roots

(no roots exist)

Series expansion at n=∞

$$1+\frac{2\,i\,\pi\,k}{n}-\frac{2\left(\pi^2\,k^2\right)}{n^2}-\frac{4\,i\,\pi^3\,k^3}{3\,n^3}+O\left(\left(\frac{1}{n}\right)^4\right)$$

(Laurent series)

Derivative

$$\frac{\partial}{\partial n}\left(\cos\left(\frac{2\,k\,\pi}{n}\right)+i\,\sin\left(\frac{2\,k\,\pi}{n}\right)\right)=\frac{2\,\pi\,k\left(\sin\left(\frac{2\,\pi\,k}{n}\right)-i\,\cos\left(\frac{2\,\pi\,k}{n}\right)\right)}{n^2}$$

Indefinite integral

$$\int\left(\cos\left(\frac{2\,k\,\pi}{n}\right)+i\,\sin\left(\frac{2\,k\,\pi}{n}\right)\right)dn=n\,e^{(2\,i\,\pi\,k)/n}-2\,i\,\pi\,k\,\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{n}\right)+\text{constant}$$

Ei(x) is the exponential integral Ei

Alternative representations

$$\cos\left(\frac{2\,(k\,\pi)}{n}\right)+i\,\sin\left(\frac{2\,(k\,\pi)}{n}\right)=\cosh\left(-\frac{2\,i\,k\,\pi}{n}\right)+i\,\cos\left(\frac{\pi}{2}-\frac{2\,k\,\pi}{n}\right)$$

$$\cos\left(\frac{2\,(k\,\pi)}{n}\right)+i\,\sin\left(\frac{2\,(k\,\pi)}{n}\right)=\cosh\left(\frac{2\,i\,k\,\pi}{n}\right)+i\,\cos\left(\frac{\pi}{2}-\frac{2\,k\,\pi}{n}\right)$$

$$\cos\left(\frac{2\,(k\,\pi)}{n}\right)+i\,\sin\left(\frac{2\,(k\,\pi)}{n}\right)=\cosh\left(-\frac{2\,i\,k\,\pi}{n}\right)-i\,\cos\left(\frac{\pi}{2}+\frac{2\,k\,\pi}{n}\right)$$

cosh(x) is the hyperbolic cosine function

Series representations

$$\cos\left(\frac{2(k\pi)}{n}\right)+i\sin\left(\frac{2(k\pi)}{n}\right)=\sum_{j=0}^{\infty}\frac{(-1)^j\left(\frac{k}{n}\right)^{2j}(2\pi)^{2j}(2ik\pi(2j)!+n(1+2j)!)}{n(2j)!(1+2j)!}$$

$$\cos\left(\frac{2(k\pi)}{n}\right)+i\sin\left(\frac{2(k\pi)}{n}\right)=\sum_{j=0}^{\infty}\frac{(-1)^j\left(\left(\frac{k}{n}\right)^{2j}(2\pi)^{2j}+i\left(-\frac{\pi}{2}+\frac{2k\pi}{n}\right)^{2j}\right)}{(2j)!}$$

$$\cos\left(\frac{2(k\pi)}{n}\right)+i\sin\left(\frac{2(k\pi)}{n}\right)=\sum_{j=0}^{\infty}\left(\frac{i(-1)^j\left(\frac{k}{n}\right)^{1+2j}(2\pi)^{1+2j}}{(1+2j)!}+\frac{(-1)^{1+j}\left(-\frac{\pi}{2}+\frac{2k\pi}{n}\right)^{1+2j}}{(1+2j)!}\right)$$

$n!$ is the factorial function

Integral representations

$$\cos\left(\frac{2(k\pi)}{n}\right)+i\sin\left(\frac{2(k\pi)}{n}\right)=\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-(k^2\pi^2)/(n^2 s)+s}(k\pi-in s)}{2n\sqrt{\pi}\,s^{3/2}}\,ds \quad \text{for } \gamma>0$$

$$\cos\left(\frac{2(k\pi)}{n}\right)+i\sin\left(\frac{2(k\pi)}{n}\right)=\frac{k\sqrt{\pi}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-(k^2\pi^2)/(n^2 s)+s}}{s^{3/2}}\,ds-2n\int_{\frac{\pi}{2}}^{\frac{2k\pi}{n}}\sin(t)\,dt}{2n} \quad \text{for } \gamma>0$$

$$\cos\left(\frac{2(k\pi)}{n}\right)+i\sin\left(\frac{2(k\pi)}{n}\right)=\frac{i\left(-n\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{e^{-(k^2\pi^2)/(n^2 s)+s}}{\sqrt{s}}\,ds+4k\pi^{3/2}\int_0^1\cos\left(\frac{2k\pi t}{n}\right)dt\right)}{2n\sqrt{\pi}} \quad \text{for } \gamma>0$$

Multiple-argument formulas

$$\cos\left(\frac{2(k\pi)}{n}\right)+i\sin\left(\frac{2(k\pi)}{n}\right)=-1+2\cos^2\left(\frac{k\pi}{n}\right)+2i\cos\left(\frac{k\pi}{n}\right)\sin\left(\frac{k\pi}{n}\right)$$

$$\cos\left(\frac{2(k\pi)}{n}\right)+i\sin\left(\frac{2(k\pi)}{n}\right)=1+2i\cos\left(\frac{k\pi}{n}\right)\sin\left(\frac{k\pi}{n}\right)-2\sin^2\left(\frac{k\pi}{n}\right)$$

$$\cos\left(\frac{2(k\pi)}{n}\right)+i\sin\left(\frac{2(k\pi)}{n}\right)=-1+2\cos^2\left(\frac{k\pi}{n}\right)+i\left(3\sin\left(\frac{2k\pi}{3n}\right)-4\sin^3\left(\frac{2k\pi}{3n}\right)\right)$$

From the indefinite integral result

$$\int\left(\cos\left(\frac{2k\pi}{n}\right)+i\sin\left(\frac{2k\pi}{n}\right)\right)dn=n\,e^{(2i\pi k)/n}-2i\pi k\,\mathrm{Ei}\left(\frac{2ik\pi}{n}\right)+\text{constant}$$

we obtain:

e^((2 i k π)/n) n - 2 i k π Ei((2 i k π)/n)

Input

$$e^{(2ik\pi)/n}\,n-2ik\pi\,\mathrm{Ei}\left(\frac{2ik\pi}{n}\right)$$

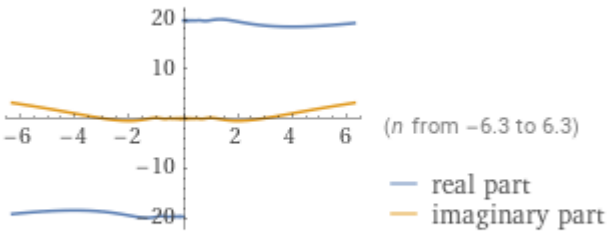
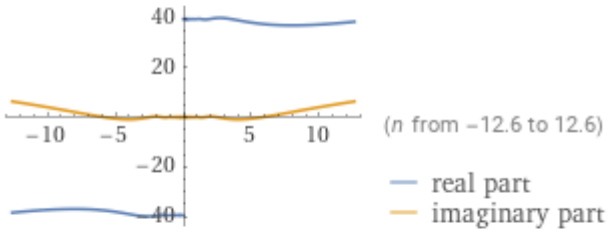
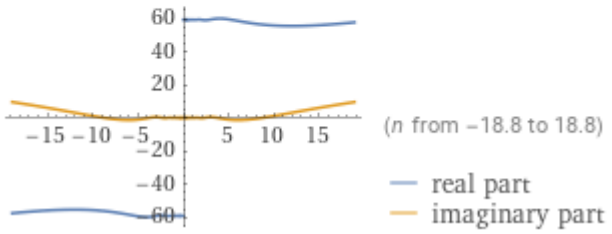
$\mathrm{Ei}(x)$ is the exponential integral Ei

i is the imaginary unit

Values

k	
1	$e^{(2i\pi)/n}\, n - 2i\pi\,\mathrm{Ei}\left(\frac{2i\pi}{n}\right)$
2	$e^{(4i\pi)/n}\, n - 4i\pi\,\mathrm{Ei}\left(\frac{4i\pi}{n}\right)$
3	$e^{(6i\pi)/n}\, n - 6i\pi\,\mathrm{Ei}\left(\frac{6i\pi}{n}\right)$

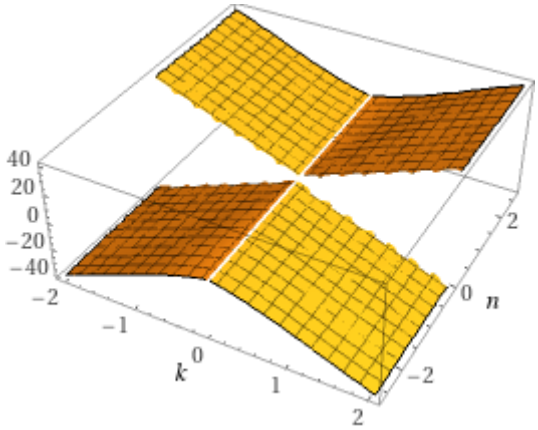
Plots (figures that can be related to the open strings)

k	
1	
2	
3	

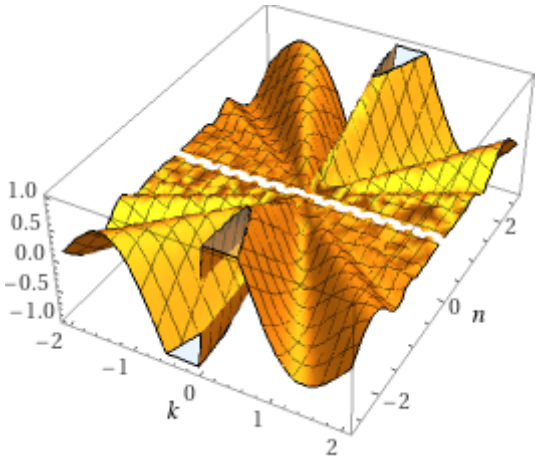
3D plots

Real part **(figures that can be related to the D-branes/Instantons)**

The key observation from the below plots and is that at $k = 1$, which is taken as the energy density of the universe at the Big Bang, with $n = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.

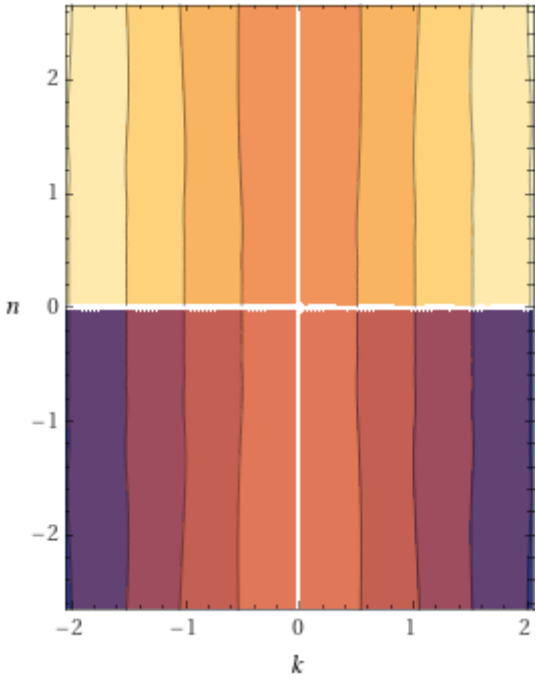


Imaginary part

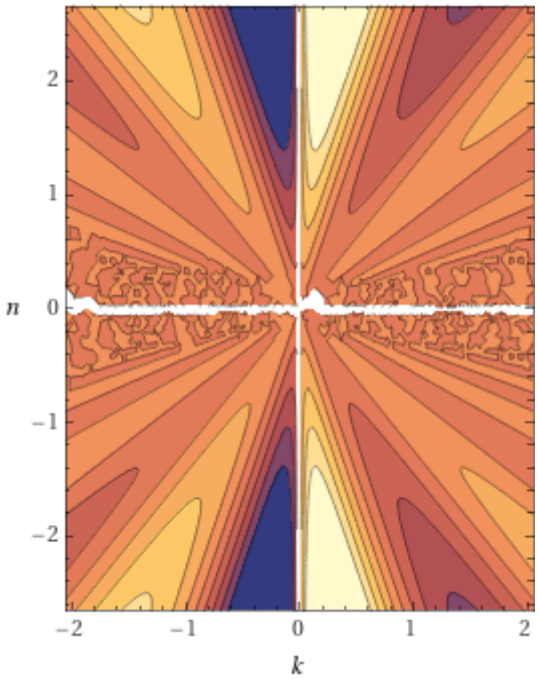


Contour plots

Real part



Imaginary part



Alternate forms

$$-i\left(2\pi k\,\mathrm{Ei}\left(\frac{2ik\pi}{n}\right)+in\,e^{(2i\pi k)/n}\right)$$

$$n\,e^{(2i\pi k)/n}-2i\pi k\left(\mathrm{Ci}\left(\frac{2k\pi}{n}\right)+i\,\mathrm{Si}\left(\frac{2k\pi}{n}\right)+\frac{1}{2}\left(\log\left(\frac{2ik}{n}\right)-\log\left(-\frac{in}{2k}\right)+2\log(\pi)\right)-\log\left(\frac{\pi k}{n}\right)-\log(2)\right)$$

Ci(x) is the cosine integral

log(x) is the natural logarithm

Si(x) is the sine integral

Series expansion at n=0

$$e^{(2i\pi k)/n}\left(-n+O\left(n^2\right)\right)+e^{(2i\pi k)/n}\left(n+O\left(n^2\right)\right)-2\pi^2 k\left\lfloor\frac{-\arg\left(-\frac{i}{k}\right)-\arg(n)+\pi}{2\pi}\right\rfloor+2\pi^2 k\left\lfloor\frac{-\arg\left(\frac{i}{k}\right)-\arg(n)+\pi}{2\pi}\right\rfloor-2\pi^2 k\left\lfloor\frac{-\arg(-ik)+\arg(n)+\pi}{2\pi}\right\rfloor+2\pi^2 k\left\lfloor\frac{-\arg(ik)+\arg(n)+\pi}{2\pi}\right\rfloor+i\pi k\log\left(-\frac{i}{2\pi k}\right)-i\pi k\log\left(\frac{i}{2\pi k}\right)+i\pi k\log(-2i\pi k)-i\pi k\log(2i\pi k)$$

arg(z) is the complex argument

$\lfloor x \rfloor$ is the floor function

Series expansion at n=∞

$$n-i\pi k\left(-\log\left(-\frac{i}{2k}\right)+\log(2i\pi k)-2\log(n)+2\gamma-2+\log(\pi)\right)+\frac{2\pi^2 k^2}{n}+\frac{2i\pi^3 k^3}{3n^2}+O\left(\left(\frac{1}{n}\right)^3\right)$$

(Puiseux series)

γ is the Euler-Mascheroni constant

Derivative

$$\frac{\partial}{\partial n}\left(e^{(2ik\pi)/n}\,n-2ik\pi\,\mathrm{Ei}\left(\frac{2ik\pi}{n}\right)\right)=e^{(2i\pi k)/n}$$

Indefinite integral

$$\int\left(e^{(2\,i\,k\,\pi)/n}\,n-2\,i\,k\,\pi\,\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{n}\right)\right)dn=$$
$$\frac{1}{2}\,n\,e^{(2\,i\,\pi\,k)/n}\,(n-2\,i\,\pi\,k)-2\,\pi\,k\,(\pi\,k+i\,n)\,\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{n}\right)+\text{constant}$$

Alternative representations

$$e^{(2\,(i\,k\,\pi))/n}\,n-i\left(2\,k\,\pi\,\mathrm{Ei}\left(\frac{2\,(i\,k\,\pi)}{n}\right)\right)=e^{(2\,(i\,k\,\pi))/n}\,n-i\left(2\,k\,\pi\,\mathrm{li}\left(e^{(2\,(i\,k\,\pi))/n}\right)\right)$$
$$\text{for}\ -\pi<2\,\pi\,\mathrm{Re}\left(\frac{k}{n}\right)\le\pi$$

$$e^{(2\,(i\,k\,\pi))/n}\,n-i\left(2\,k\,\pi\,\mathrm{Ei}\left(\frac{2\,(i\,k\,\pi)}{n}\right)\right)=z^{(2\,(i\,k\,\pi))/n}\,n-i\left(2\,k\,\pi\,\mathrm{li}\left(e^{(2\,(i\,k\,\pi))/n}\right)\right)$$
$$\text{for}\left(z=e\ \text{and}\ -\pi<2\,\pi\,\mathrm{Re}\left(\frac{k}{n}\right)\le\pi\right)$$

$$e^{(2\,(i\,k\,\pi))/n}\,n-i\left(2\,k\,\pi\,\mathrm{Ei}\left(\frac{2\,(i\,k\,\pi)}{n}\right)\right)=$$
$$-2\,i\,k\,\pi\left(-\Gamma\left(0,-\frac{2\,i\,k\,\pi}{n}\right)-\log\left(-\frac{2\,i\,k\,\pi}{n}\right)+\frac{1}{2}\left(\log\left(\frac{2\,i\,k\,\pi}{n}\right)-\log\left(\frac{1}{\frac{2\,i\,k\,\pi}{n}}\right)\right)\right)+$$
$$n\,e^{(2\,i\,k\,\pi)/n}$$

$\mathrm{li}(x)$ is the logarithmic integral

$\mathrm{Re}(z)$ is the real part of z

$\Gamma(a,x)$ is the incomplete gamma function

Series representations

$$e^{(2\,(i\,k\,\pi))/n}\,n-i\left(2\,k\,\pi\,\mathrm{Ei}\left(\frac{2\,(i\,k\,\pi)}{n}\right)\right)=-2\,i\,\gamma\,k\,\pi+i\,k\,\pi\log\left(-\frac{i\,n}{2\,k}\right)-$$
$$i\,k\,\pi\log(\pi)-i\,k\,\pi\log\left(\frac{2\,i\,k\,\pi}{n}\right)+n\sum_{j=0}^{\infty}\frac{\left(\frac{i\,k}{n}\right)^j(2\,\pi)^j}{j!}-2\,i\,k\,\pi\sum_{j=1}^{\infty}\frac{\left(\frac{i\,k}{n}\right)^j(2\,\pi)^j}{j\,j!}$$

$$e^{(2(i k \pi))/n}\, n - i\left(2 k \pi \operatorname{Ei}\left(\frac{2 (i k \pi)}{n}\right)\right) = -2 i k \pi \operatorname{Ei}(z_0) + e^{z_0}\, n \sum_{j=0}^{\infty} \frac{\left(\frac{2 i k \pi}{n} - z_0\right)^j}{j!} + 2 i k \pi \sum_{j=1}^{\infty} \frac{(-1)^j\, \Gamma(j, -z_0)\left(\frac{2 i k \pi}{n} - z_0\right)^j z_0^{-j}}{j!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$e^{(2(i k \pi))/n}\, n - i\left(2 k \pi \operatorname{Ei}\left(\frac{2 (i k \pi)}{n}\right)\right) = -2 i \gamma k \pi + i k \pi \log\left(-\frac{i n}{2 k}\right) - i k \pi \log(\pi) - i k \pi \log\left(\frac{2 i k \pi}{n}\right) + n \sum_{\mathcal{A}=0}^{\infty} \frac{\left(\frac{i k}{n}\right)^{\mathcal{A}} (2 \pi)^{\mathcal{A}}}{\mathcal{A}!} + 2 i e^{(2 i k \pi)/n} k \pi \sum_{\mathcal{A}=1}^{\infty} \sum_{j=1}^{\mathcal{A}} \frac{\left(\frac{i k}{n}\right)^{\mathcal{A}} (-2 \pi)^{\mathcal{A}}}{j\, \mathcal{A}!}$$

$n!$ is the factorial function

$\mathbb{R}$ is the set of real numbers

Integral representations

$$e^{(2(i k \pi))/n}\, n - i\left(2 k \pi \operatorname{Ei}\left(\frac{2 (i k \pi)}{n}\right)\right) = e^{(2 i k \pi)/n}\, n - 2 i k \pi \mathcal{P} \int_{-\infty}^{\frac{2 i k \pi}{n}} \frac{e^t}{t}\, dt \quad \text{for } \frac{2 i k}{n} \in \mathbb{R}$$

$$e^{(2(i k \pi))/n}\, n - i\left(2 k \pi \operatorname{Ei}\left(\frac{2 (i k \pi)}{n}\right)\right) = e^{(2 i k \pi)/n}\, n + 2 i k \pi \mathcal{P} \int_{-\frac{2 i k \pi}{n}}^{\infty} \frac{e^{-t}}{t}\, dt \quad \text{for } \frac{2 i k}{n} \in \mathbb{R}$$

$$e^{(2(i k \pi))/n}\, n - i\left(2 k \pi \operatorname{Ei}\left(\frac{2 (i k \pi)}{n}\right)\right) = e^{(2 i k \pi)/n}\, n - 2 i \gamma k \pi - 2 i k \pi \int_0^{\frac{2 i k \pi}{n}} \frac{-1 + e^t}{t}\, dt + i k \pi \log\left(-\frac{i n}{2 k}\right) - i k \pi \log(\pi) - i k \pi \log\left(\frac{2 i k \pi}{n}\right)$$

$\mathcal{P}\int f\, dx$ is the Cauchy principal value integral

Again, from the indefinite integral result

$$\int\left(e^{(2\,i\,k\,\pi)/n}\,n-2\,i\,k\,\pi\,\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{n}\right)\right)dn=$$
$$\frac{1}{2}\,n\,e^{(2\,i\,\pi\,k)/n}\,(n-2\,i\,\pi\,k)-2\,\pi\,k\,(\pi\,k+i\,n)\,\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{n}\right)+\text{constant}$$

we obtain:

1/2 e^((2 i k π)/n) n (n - 2 i k π) - 2 k π (i n + k π) Ei((2 i k π)/n)

Input

$$\frac{1}{2}\,e^{(2\,i\,k\,\pi)/n}\,n\,(n-2\,i\,k\,\pi)-2\,k\,\pi\,(i\,n+k\,\pi)\,\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{n}\right)$$

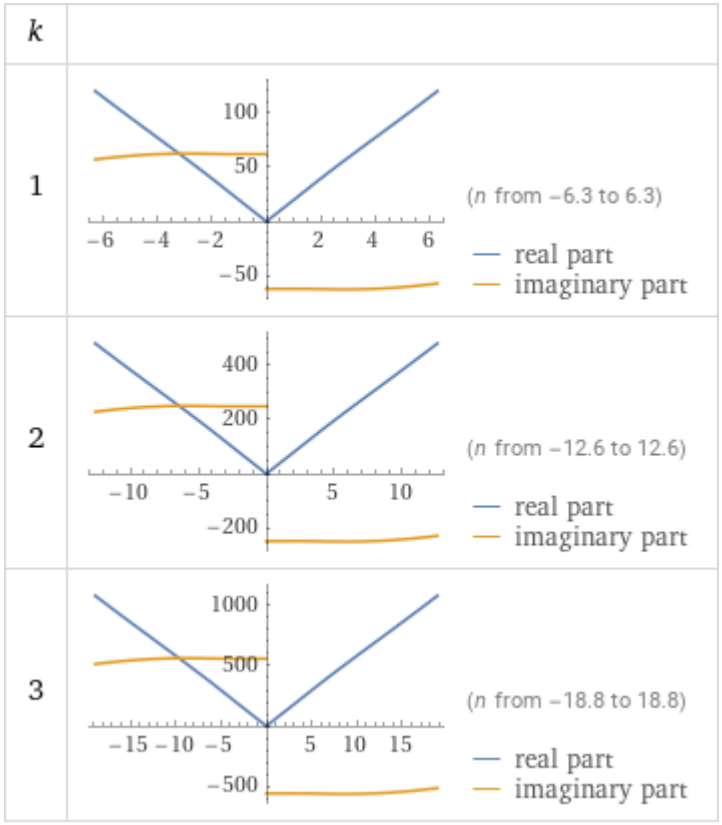
Ei(x) is the exponential integral Ei

i is the imaginary unit

Values

k	
1	$\frac{1}{2}\,e^{(2\,i\,\pi)/n}\,n\,(n-2\,i\,\pi)-2\,\pi\,(\pi+i\,n)\,\mathrm{Ei}\left(\frac{2\,i\,\pi}{n}\right)$
2	$\frac{1}{2}\,e^{(4\,i\,\pi)/n}\,n\,(n-4\,i\,\pi)-4\,\pi\,(2\,\pi+i\,n)\,\mathrm{Ei}\left(\frac{4\,i\,\pi}{n}\right)$
3	$\frac{1}{2}\,e^{(6\,i\,\pi)/n}\,n\,(n-6\,i\,\pi)-6\,\pi\,(3\,\pi+i\,n)\,\mathrm{Ei}\left(\frac{6\,i\,\pi}{n}\right)$

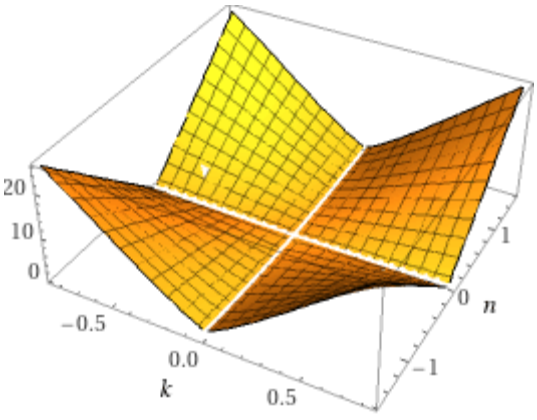
Plots **(figures that can be related to the open strings)**



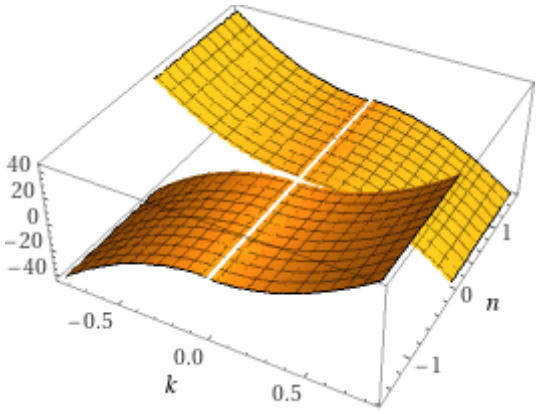
3D plots

Real part **(figures that can be related to the D-branes/Instantons)**

The key observation from the below plots and is that at $n = 1$, which is taken as the energy density of the universe at the Big Bang, with $k = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.

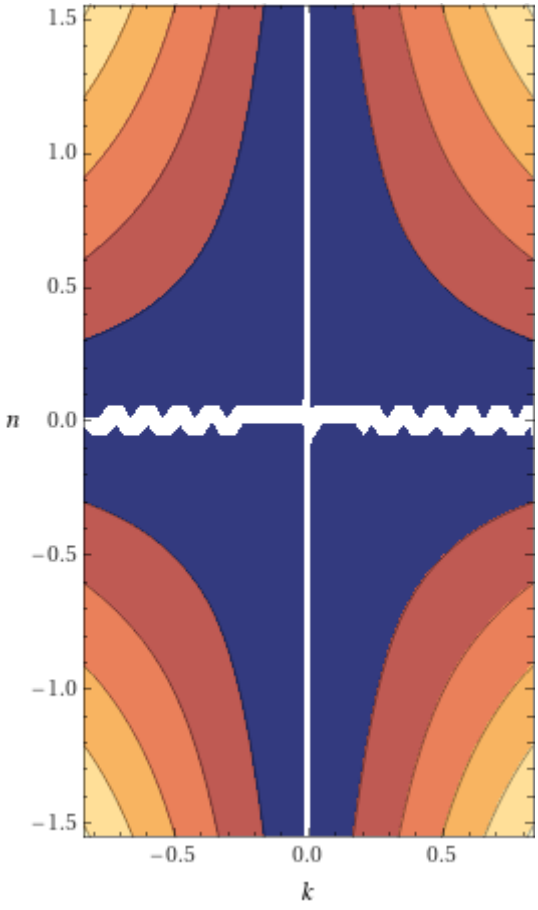


Imaginary part

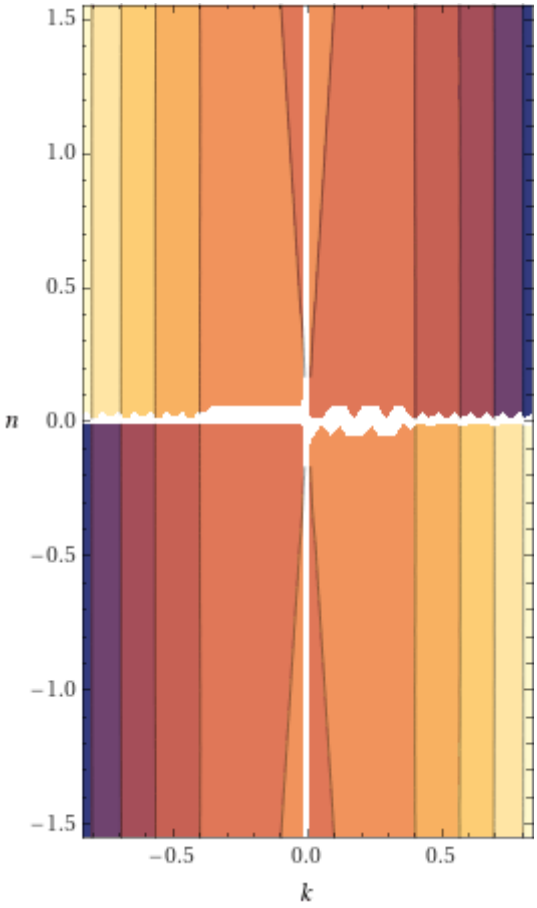


Contour plots

Real part



Imaginary part



Expanded form

$$-2\pi^2 k^2 \operatorname{Ei}\left(\frac{2ik\pi}{n}\right) - 2i\pi k n \operatorname{Ei}\left(\frac{2ik\pi}{n}\right) + \frac{1}{2} n^2 e^{(2i\pi k)/n} - i\pi k n e^{(2i\pi k)/n}$$

Alternate forms

$$\frac{1}{2}\left(-4\pi^2 k^2 \operatorname{Ei}\left(\frac{2ik\pi}{n}\right) - 4i\pi k n \operatorname{Ei}\left(\frac{2ik\pi}{n}\right) + n^2 e^{(2i\pi k)/n} - 2i\pi k n e^{(2i\pi k)/n}\right)$$

$$\frac{1}{2} n e^{(2i\pi k)/n}(n - 2i\pi k) - 2\pi k(\pi k + in)\left(\operatorname{Ci}\left(\frac{2k\pi}{n}\right) + i \operatorname{Si}\left(\frac{2k\pi}{n}\right) + \frac{1}{2}\left(\log\left(\frac{2ik}{n}\right) - \log\left(-\frac{in}{2k}\right) + 2\log(\pi)\right) - \log\left(\frac{\pi k}{n}\right) - \log(2)\right)$$

Ci(x) is the cosine integral

log(x) is the natural logarithm

Si(x) is the sine integral

Series expansion at n=∞

$$\frac{n^2}{2} - i\pi k n\left(-\log\left(-\frac{i}{2k}\right) + \log(2i\pi k) - 2\log(n) + 2\gamma + \log(\pi)\right) + \pi^2 k^2\left(\log\left(-\frac{i}{2\pi k}\right) - \log(2i\pi k) + 2\log(n) - 2\gamma + 5\right) - \frac{2i\pi^3 k^3}{3n} + O\left(\left(\frac{1}{n}\right)^2\right)$$

(generalized Puiseux series)

γ is the Euler-Mascheroni constant

Derivative

$$\frac{\partial}{\partial n}\left(\frac{1}{2}e^{(2ik\pi)/n} n(n - 2ik\pi) - 2k\pi(in + k\pi)\,\mathrm{Ei}\left(\frac{2ik\pi}{n}\right)\right) = n e^{(2i\pi k)/n} - 2i\pi k\,\mathrm{Ei}\left(\frac{2ik\pi}{n}\right)$$

Indefinite integral

$$\int\left(\frac{1}{2}e^{(2ik\pi)/n} n(n - 2ik\pi) - 2k\pi(in + k\pi)\,\mathrm{Ei}\left(\frac{2ik\pi}{n}\right)\right)dn = \frac{1}{6}\left(2i\pi k\left(2\pi^2 k^2 + 6i\pi k n - 3n^2\right)\mathrm{Ei}\left(\frac{2ik\pi}{n}\right) + n e^{(2i\pi k)/n}\left(-2\pi^2 k^2 - 5i\pi k n + n^2\right)\right) + \text{constant}$$

From the indefinite integral result

$$\int\left(\frac{1}{2}e^{(2ik\pi)/n} n(n - 2ik\pi) - 2k\pi(in + k\pi)\,\mathrm{Ei}\left(\frac{2ik\pi}{n}\right)\right)dn = \frac{1}{6}\left(2i\pi k\left(2\pi^2 k^2 + 6i\pi k n - 3n^2\right)\mathrm{Ei}\left(\frac{2ik\pi}{n}\right) + n e^{(2i\pi k)/n}\left(-2\pi^2 k^2 - 5i\pi k n + n^2\right)\right) + \text{constant}$$

1/6 (e^((2 i k π)/n) n (n^2 - 5 i k n π - 2 k^2 π^2) + 2 i k π (-3 n^2 + 6 i k n π + 2 k^2 π^2) Ei((2 i k π)/n))

for n = 12.6:

1/6 (e^((2 i k π)/12.6) 12.6 (12.6^2 - 5 i k 12.6 π - 2 k^2 π^2) + 2 i k π (-3 12.6^2 + 6 i k 12.6 π + 2 k^2 π^2) Ei((2 i k π)/12.6))

Input

$$\frac{1}{6}\left(e^{(2\,i\,k\,\pi)/12.6}\times 12.6\left(12.6^2-5\,i\,k\times 12.6\,\pi-2\,k^2\,\pi^2\right)+2\,i\,k\,\pi\left(-3\times 12.6^2+6\,i\,k\times 12.6\,\pi+2\,k^2\,\pi^2\right)\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{12.6}\right)\right)$$

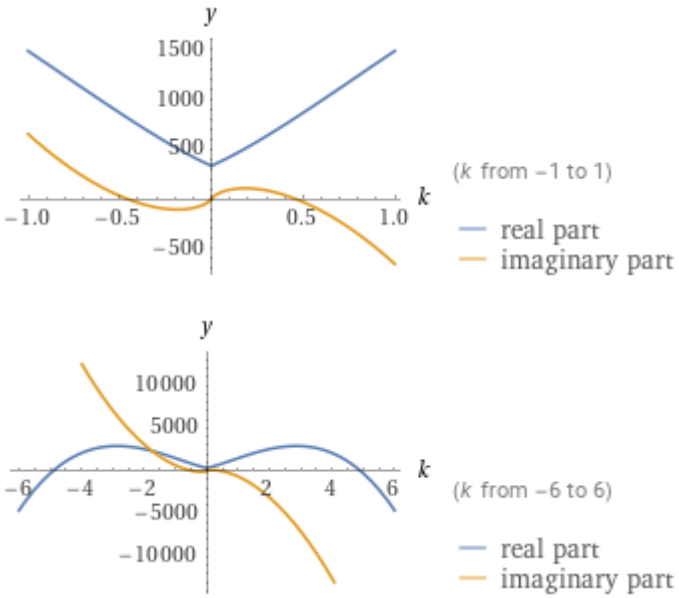
Ei(x) is the exponential integral Ei

i is the imaginary unit

Result

$$\frac{1}{6}\left(2\,i\,\pi\,k\left(2\,\pi^2\,k^2+(237.504\,i)\,k-476.28\right)\mathrm{Ei}((0.498666\,i)\,k)+12.6\,e^{(0.498666\,i)\,k}\left(-2\,\pi^2\,k^2-(197.92\,i)\,k+158.76\right)\right)$$

Plots (figures that can be related to the open strings)



Alternate forms

$$k\left((-248.714+(20.6709\,i)\,k)\,k-498.759\,i\right)\mathrm{Ei}((0.498666\,i)\,k)+e^{(0.498666\,i)\,k}(333.396+(-41.4523\,k-415.633\,i)\,k)$$

$$k\left((20.6709\,i)\,k^2-248.714\,k-498.759\,i\right)\mathrm{Ei}((0.498666\,i)\,k)+e^{(0.498666\,i)\,k}\left(-41.4523\,k^2-(415.633\,i)\,k+333.396\right)$$

$$(2.0944\,i)\left((9.8696+0\,i)\,k^3\,\mathrm{Ei}((0.498666\,i)\,k)-(238.14+0\,i)\,k\,\mathrm{Ei}((0.498666\,i)\,k)+(118.752\,i)\,k^2\,\mathrm{Ei}((0.498666\,i)\,k)\right)-4.2\,e^{(0.498666\,i)\,k}\left(9.8696\,k^2+(98.9602\,i)\,k-79.38\right)$$

Expanded form

$$\frac{2}{3}\,i\,\pi^3\,k^3\,\mathrm{Ei}((0.498666\,i)\,k)-248.714\,k^2\,\mathrm{Ei}((0.498666\,i)\,k)-(498.759\,i)\,k\,\mathrm{Ei}((0.498666\,i)\,k)-41.4523\,e^{(0.498666\,i)\,k}\,k^2-(415.633\,i)\,e^{(0.498666\,i)\,k}\,k+333.396\,e^{(0.498666\,i)\,k}$$

Alternate form assuming k>0

$$\frac{1}{3}\,i\,\pi\,k\left(2\,\pi^2\,k^2+(237.504\,i)\,k-476.28\right)\mathrm{Ei}((0.498666\,i)\,k)+2.1\,e^{(0.498666\,i)\,k}\left(-2\,\pi^2\,k^2-(197.92\,i)\,k+158.76\right)$$

Numerical roots

$$k\approx -2.47866\times10^{-16}-0.815865\,i\ldots$$

$$k\approx 375.925\,i\ldots$$

Series expansion at k=0

$$\lfloor 0.159155 \arg(k) + 0.75 \rfloor \left(-(1566.9 + 0\,i)\,k + (781.358\,i)\,k^2 + (64.9394 + 0\,i)\,k^3 + O\left(k^4\right)\right) + \lfloor 0.25 - 0.159155 \arg(k) \rfloor \left((1566.9 + 0\,i)\,k - (781.358\,i)\,k^2 - (64.9394 + 0\,i)\,k^3 + O\left(k^4\right)\right) + \left(333.396 + ((783.449 - 190.225\,i) - (498.759\,i)\log(k))\,k + ((402.57 - 390.679\,i) - 248.714\log(k))\,k^2 + ((20.6709\,i)\log(k) - (32.4697 + 71.3545\,i))\,k^3 + O\left(k^4\right)\right)$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

$\log(x)$ is the natural logarithm

Series expansion at k=∞

$$\left(-(64.9394 + 0\,i)\,k^3 - (781.358\,i)\,k^2 + (1566.9 + 0\,i)\,k + O\left(\left(\frac{1}{k}\right)^6\right)\right) + e^{(0.498666\,i)\,k}\left(\left(7.10543 \times 10^{-15} + 0\,i\right)k^2 - \left(5.68434 \times 10^{-14} + 0\,i\right) + \frac{4.54747 \times 10^{-13}\,i}{k} + \frac{3.63798 \times 10^{-12} + 0\,i}{k^2} - \frac{16\,131.8\,i}{k^3} - \frac{388\,200. + 0\,i}{k^4} + \frac{7.78478 \times 10^{6}\,i}{k^5} + O\left(\left(\frac{1}{k}\right)^6\right)\right)$$

Derivative

$$\frac{d}{dk}\left(\frac{1}{6}\left(e^{(2\,i\,k\,\pi)/12.6} \times 12.6\left(12.6^2 - 5\,i\,k \times 12.6\,\pi - 2\,k^2\,\pi^2\right) + 2\,i\,k\,\pi\left(-3 \times 12.6^2 + 6\,i\,k \times 12.6\,\pi + 2\,k^2\,\pi^2\right)\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{12.6}\right)\right)\right) = \left((62.0126\,i)\,k^2 - 497.428\,k - 498.759\,i\right)\mathrm{Ei}((0.498666\,i)\,k) + e^{(0.498666\,i)\,k}\left(\left(2.92199 \times 10^{-15}\,i\right)k^2 - 124.357\,k - 748.139\,i\right)$$

Indefinite integral

$$\int \frac{1}{6}\left(12.6\, e^{(0.498666\, i)\, k}\left(158.76-(197.92\, i)\, k-2\, k^2\, \pi^2\right)+2\, i\, k\, \pi\left(-476.28+(237.504\, i)\right.\right.\, dk =$$
$$\left.\left.k+2\, k^2\, \pi^2\right)\mathrm{Ei}((0.498666\, i)\, k)\right)$$
$$\left((5.16771\, i)\, k^2-82.9047\, k-249.38\, i\right) k^2\, \mathrm{Ei}((0.498666\, i)\, k)+e^{(0.498666\, i)\, k}\left(-10.3631\right.$$
$$\left. k^3-(145.471\, i)\, k^2+250.047\, k-167.144\, i\right)+\text{constant}$$

Alternative representations

$$\frac{1}{6}\left(e^{(2\, i\, k\, \pi)/12.6}\, 12.6\left(12.6^2-i\,(5\, k\, 12.6\, \pi)-2\, k^2\, \pi^2\right)+\right.$$
$$\left.2\, i\, k\, \pi\left(-3\times 12.6^2+6\, i\, k\, 12.6\, \pi+2\, k^2\, \pi^2\right)\mathrm{Ei}\left(\frac{2\, i\, k\, \pi}{12.6}\right)\right)=$$
$$\frac{1}{6}\left(e^{(2\, i\, k\, \pi)/12.6}\, 12.6\left(12.6^2-i\,(5\, k\, 12.6\, \pi)-2\, k^2\, \pi^2\right)+\right.$$
$$\left.2\, i\, k\, \pi\left(-3\times 12.6^2+6\, i\, k\, 12.6\, \pi+2\, k^2\, \pi^2\right)\mathrm{li}\left(e^{(2\, i\, k\, \pi)/12.6}\right)\right)$$
$$\text{for } -\pi<\mathrm{Im}((0.498666\, i)\, k)\le\pi$$

$$\frac{1}{6}\left(e^{(2\, i\, k\, \pi)/12.6}\, 12.6\left(12.6^2-i\,(5\, k\, 12.6\, \pi)-2\, k^2\, \pi^2\right)+\right.$$
$$\left.2\, i\, k\, \pi\left(-3\times 12.6^2+6\, i\, k\, 12.6\, \pi+2\, k^2\, \pi^2\right)\mathrm{Ei}\left(\frac{2\, i\, k\, \pi}{12.6}\right)\right)=$$
$$\frac{1}{6}\left(z^{(2\, i\, k\, \pi)/12.6}\, 12.6\left(12.6^2-i\,(5\, k\, 12.6\, \pi)-2\, k^2\, \pi^2\right)+\right.$$
$$\left.2\, i\, k\, \pi\left(-3\times 12.6^2+6\, i\, k\, 12.6\, \pi+2\, k^2\, \pi^2\right)\mathrm{li}\left(e^{(2\, i\, k\, \pi)/12.6}\right)\right)$$
$$\text{for } (z=e \text{ and } -\pi<\mathrm{Im}((0.498666\, i)\, k)\le\pi)$$

$$\frac{1}{6}\left(e^{(2\, i\, k\, \pi)/12.6}\, 12.6\left(12.6^2-i\,(5\, k\, 12.6\, \pi)-2\, k^2\, \pi^2\right)+\right.$$
$$\left.2\, i\, k\, \pi\left(-3\times 12.6^2+6\, i\, k\, 12.6\, \pi+2\, k^2\, \pi^2\right)\mathrm{Ei}\left(\frac{2\, i\, k\, \pi}{12.6}\right)\right)=$$
$$\frac{1}{6}\left(12.6\, e^{(2\, i\, k\, \pi)/12.6}\left(-63\, i\, k\, \pi+12.6^2-2\, k^2\, \pi^2\right)+\right.$$
$$2\, i\, k\, \pi\left(-\Gamma\left(0,-\frac{2\, i\, k\, \pi}{12.6}\right)-\log\left(-\frac{2\, i\, k\, \pi}{12.6}\right)+\frac{1}{2}\left(\log\left(\frac{2\, i\, k\, \pi}{12.6}\right)-\log\left(\frac{1}{\frac{2\, i\, k\, \pi}{12.6}}\right)\right)\right)$$
$$\left.\left(75.6\, i\, k\, \pi-3\times 12.6^2+2\, k^2\, \pi^2\right)\right)$$

li(x) is the logarithmic integral

Im(z) is the imaginary part of z

$\Gamma(a, x)$ is the incomplete gamma function

Series representations

$$\frac{1}{6}\left(e^{(2\,i\,k\,\pi)/12.6}\,12.6\left(12.6^2 - i\,(5\,k\,12.6\,\pi) - 2\,k^2\,\pi^2\right) + 2\,i\,k\,\pi\left(-3\times 12.6^2 + 6\,i\,k\,12.6\,\pi + 2\,k^2\,\pi^2\right)\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{12.6}\right)\right) =$$

$$(10.3354 + 0\,i)\left((-27.8548\,i)\,k - (13.8902 + 0\,i)\,k^2 + (1.15443\,i)\,k^3 + (24.1286\,i)\,k\log\left(-\frac{2.00535\,i}{k}\right) + (12.0321 + 0\,i)\,k^2\log\left(-\frac{2.00535\,i}{k}\right) - i\,k^3\log\left(-\frac{2.00535\,i}{k}\right) - (24.1286\,i)\,k\log((0.498666\,i)\,k) - (12.0321 + 0\,i)\,k^2\log((0.498666\,i)\,k) + i\,k^3\log((0.498666\,i)\,k) + (32.2576 + 0\,i)\sum_{j=0}^{\infty}\frac{((0.498666\,i)\,k)^j}{j!} - (40.2144\,i)\,k\sum_{j=0}^{\infty}\frac{((0.498666\,i)\,k)^j}{j!} - (4.0107 + 0\,i)\,k^2\sum_{j=0}^{\infty}\frac{((0.498666\,i)\,k)^j}{j!} - (48.2573\,i)\,k\sum_{j=1}^{\infty}\frac{((0.498666\,i)\,k)^j}{j\,j!} - (24.0642 + 0\,i)\,k^2\sum_{j=1}^{\infty}\frac{((0.498666\,i)\,k)^j}{j\,j!} + (2\,i)\,k^3\sum_{j=1}^{\infty}\frac{((0.498666\,i)\,k)^j}{j\,j!}\right)$$

$$\frac{1}{6}\left(e^{(2\,i\,k\,\pi)/12.6}\,12.6\left(12.6^2 - i\,(5\,k\,12.6\,\pi) - 2\,k^2\,\pi^2\right) + \right.$$
$$\left. 2\,i\,k\,\pi\left(-3\times 12.6^2 + 6\,i\,k\,12.6\,\pi + 2\,k^2\,\pi^2\right)\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{12.6}\right)\right) =$$
$$(20.6709 + 0\,i)\left((-24.1286\,i)\,k\,\mathrm{Ei}(z_0) - (12.0321 + 0\,i)\,k^2\,\mathrm{Ei}(z_0) + i\,k^3\,\mathrm{Ei}(z_0) + \right.$$
$$(16.1288 + 0\,i)\sum_{j=0}^{\infty}\frac{((0.498666\,i)\,k)^j}{j!} - (20.1072\,i)\,k\sum_{j=0}^{\infty}\frac{((0.498666\,i)\,k)^j}{j!} -$$
$$(2.00535 + 0\,i)\,k^2\sum_{j=0}^{\infty}\frac{((0.498666\,i)\,k)^j}{j!} +$$
$$(24.1286\,i)\,k\sum_{j=1}^{\infty}\frac{(-1)^j\,\Gamma(j,-z_0)\,((0.498666\,i)\,k - z_0)^j\,z_0^{-j}}{j!} +$$
$$(12.0321 + 0\,i)\,k^2\sum_{j=1}^{\infty}\frac{(-1)^j\,\Gamma(j,-z_0)\,((0.498666\,i)\,k - z_0)^j\,z_0^{-j}}{j!} -$$
$$\left. i\,k^3\sum_{j=1}^{\infty}\frac{(-1)^j\,\Gamma(j,-z_0)\,((0.498666\,i)\,k - z_0)^j\,z_0^{-j}}{j!}\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{6}\left(e^{(2\,i\,k\,\pi)/12.6}\,12.6\left(12.6^2-i\,(5\,k\,12.6\,\pi)-2\,k^2\,\pi^2\right)+\right.$$
$$\left.2\,i\,k\,\pi\left(-3\times 12.6^2+6\,i\,k\,12.6\,\pi+2\,k^2\,\pi^2\right)\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{12.6}\right)\right)=$$
$$(10.3354+0\,i)\left((-27.8548\,i)\,k-(13.8902+0\,i)\,k^2+(1.15443\,i)\,k^3+\right.$$
$$(24.1286\,i)\,k\log\left(-\frac{2.00535\,i}{k}\right)+(12.0321+0\,i)\,k^2\log\left(-\frac{2.00535\,i}{k}\right)-$$
$$i\,k^3\log\left(-\frac{2.00535\,i}{k}\right)-(24.1286\,i)\,k\log((0.498666\,i)\,k)-$$
$$(12.0321+0\,i)\,k^2\log((0.498666\,i)\,k)+i\,k^3\log((0.498666\,i)\,k)+$$
$$(32.2576+0\,i)\sum_{\mathcal{A}=0}^{\infty}\frac{((0.498666\,i)\,k)^{\mathcal{A}}}{\mathcal{A}!}-(40.2144\,i)\,k\sum_{\mathcal{A}=0}^{\infty}\frac{((0.498666\,i)\,k)^{\mathcal{A}}}{\mathcal{A}!}-$$
$$(4.0107+0\,i)\,k^2\sum_{\mathcal{A}=0}^{\infty}\frac{((0.498666\,i)\,k)^{\mathcal{A}}}{\mathcal{A}!}+$$
$$(48.2573\,i)\,e^{(0.498666\,i)\,k}\,k\sum_{\mathcal{A}=1}^{\infty}\sum_{j=1}^{\mathcal{A}}\frac{(-1)^{\mathcal{A}}\,((0.498666\,i)\,k)^{\mathcal{A}}}{j\,\mathcal{A}!}+$$
$$(24.0642+0\,i)\,e^{(0.498666\,i)\,k}\,k^2\sum_{\mathcal{A}=1}^{\infty}\sum_{j=1}^{\mathcal{A}}\frac{(-1)^{\mathcal{A}}\,((0.498666\,i)\,k)^{\mathcal{A}}}{j\,\mathcal{A}!}-$$
$$\left.(2\,i)\,e^{(0.498666\,i)\,k}\,k^3\sum_{\mathcal{A}=1}^{\infty}\sum_{j=1}^{\mathcal{A}}\frac{(-1)^{\mathcal{A}}\,((0.498666\,i)\,k)^{\mathcal{A}}}{j\,\mathcal{A}!}\right)$$

$n!$ is the factorial function

$\mathbb{R}$ is the set of real numbers

Integral representations

$$\frac{1}{6}\left(e^{(2\,i\,k\,\pi)/12.6}\,12.6\left(12.6^2-i\,(5\,k\,12.6\,\pi)-2\,k^2\,\pi^2\right)+\right.$$
$$\left.2\,i\,k\,\pi\left(-3\times 12.6^2+6\,i\,k\,12.6\,\pi+2\,k^2\,\pi^2\right)\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{12.6}\right)\right)=$$
$$e^{(0.498666\,i)\,k}\left(333.396-(415.633\,i)\,k-41.4523\,k^2\right)+$$
$$k\left(-498.759\,i-248.714\,k+(20.6709\,i)\,k^2\right)\mathcal{P}\int_{-\infty}^{(0.498666\,i)\,k}\frac{e^t}{t}\,dt$$

for $(0.498666\,i)\,k\in\mathbb{R}$

$$\frac{1}{6}\left(e^{(2\,i\,k\,\pi)/12.6}\,12.6\left(12.6^2 - i\,(5\,k\,12.6\,\pi) - 2\,k^2\,\pi^2\right) + 2\,i\,k\,\pi\left(-3\times 12.6^2 + 6\,i\,k\,12.6\,\pi + 2\,k^2\,\pi^2\right)\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{12.6}\right)\right) =$$
$$-4.2\,e^{(0.498666\,i)\,k}\left(-79.38 + (98.9602\,i)\,k + k^2\,\pi^2\right) + (1.0472\,i)\,k\left(-238.14 + (118.752\,i)\,k + k^2\,\pi^2\right)\left(1.15443 + 2\int_0^{(0.498666\,i)\,k}\frac{-1+e^t}{t}\,dt - \log\left(-\frac{2.00535\,i}{k}\right) + \log((0.498666\,i)\,k)\right)$$

$$\frac{1}{6}\left(e^{(2\,i\,k\,\pi)/12.6}\,12.6\left(12.6^2 - i\,(5\,k\,12.6\,\pi) - 2\,k^2\,\pi^2\right) + 2\,i\,k\,\pi\left(-3\times 12.6^2 + 6\,i\,k\,12.6\,\pi + 2\,k^2\,\pi^2\right)\mathrm{Ei}\left(\frac{2\,i\,k\,\pi}{12.6}\right)\right) =$$
$$e^{(0.498666\,i)\,k}\left(333.396 - (415.633\,i)\,k - 41.4523\,k^2\right) + k\left(498.759\,i + 248.714\,k - (20.6709\,i)\,k^2\right)\mathcal{P}\int_{(-0.498666\,i)\,k}^{\infty}\frac{e^{-t}}{t}\,dt$$

for $(0.498666\,i)\,k \in \mathbb{R}$

$\mathcal{P}\int f\,dx$ is the Cauchy principal value integral

From the indefinite integral

$$\int\frac{1}{6}\left(12.6\,e^{(0.498666\,i)\,k}\left(158.76 - (197.92\,i)\,k - 2\,k^2\,\pi^2\right) + 2\,i\,k\,\pi\left(-476.28 + (237.504\,i)\right.\right.\,dk =$$
$$\left.\left.k + 2\,k^2\,\pi^2\right)\mathrm{Ei}((0.498666\,i)\,k)\right)$$
$$\left((5.16771\,i)\,k^2 - 82.9047\,k - 249.38\,i\right)k^2\,\mathrm{Ei}((0.498666\,i)\,k) + e^{(0.498666\,i)\,k}\left(-10.3631\,k^3 - (145.471\,i)\,k^2 + 250.047\,k - 167.144\,i\right) + \text{constant}$$

e^((0.498666 i) k) (-167.144 i + 250.047 k - (145.471 i) k^2 - 10.3631 k^3) + k^2 (-249.38 i - 82.9047 k + (5.16771 i) k^2) Ei((0.498666 i) k)

for k = 6:

e^((0.498666 i) 6) (-167.144 i + 250.047*6 - (145.471 i) 6^2 - 10.3631 6^3) + 6^2 (-249.38 i - 82.9047 6 + (5.16771 i) 6^2) Ei((0.498666 i) 6)

Input interpretation

$$e^{(0.498666\,i)\times 6}\left(-167.144\,i + 250.047\times 6 - (145.471\,i)\times 6^2 + 6^3\times(-10.3631)\right) + 6^2\left(-249.38\,i + 6\times(-82.9047) + (5.16771\,i)\times 6^2\right)\mathrm{Ei}((0.498666\,i)\times 6)$$

$\mathrm{Ei}(x)$ is the exponential integral Ei

i is the imaginary unit

Result

$7142.31\ldots - 56271.6\ldots\, i$

(using the principal branch of the logarithm for complex exponentiation)

Alternate complex forms

$$56\,723.1\,(\cos(-1.44455) + i\sin(-1.44455))$$

$$56\,723.1\,e^{-1.44455\,i}$$

Polar coordinates

$r = 56\,723.1$ (radius), $\theta = -1.44455$ (angle)

56723.1

Alternative representations

$$e^{6\times 0.498666\,i}\left(i\,(-1)\,167.144 + 250.047\times 6 - 6^2\times 145.471\,i - 10.3631\times 6^3\right) + 6^2\left(i\,(-1)\,249.38 - 82.9047\times 6 + 6^2\times 5.16771\,i\right)\mathrm{Ei}(6\times 0.498666\,i) = \mathrm{li}\left(e^{2.992\,i}\right)6^2\left(-497.428 - 249.38\,i + 5.16771\,i\,6^2\right) + \left(1500.28 - 167.144\,i - 145.471\,i\,6^2 - 10.3631\times 6^3\right)e^{2.992\,i}$$

$$e^{6\times 0.498666\,i}\left(i\,(-1)\,167.144 + 250.047\times 6 - 6^2\times 145.471\,i - 10.3631\times 6^3\right) + 6^2\left(i\,(-1)\,249.38 - 82.9047\times 6 + 6^2\times 5.16771\,i\right)\mathrm{Ei}(6\times 0.498666\,i) = \left(-\Gamma(0, -2.992\,i) - \log(-2.992\,i) + \frac{1}{2}\left(\log(2.992\,i) - \log\left(\frac{1}{2.992\,i}\right)\right)\right) 6^2\left(-497.428 - 249.38\,i + 5.16771\,i\,6^2\right) + \left(1500.28 - 167.144\,i - 145.471\,i\,6^2 - 10.3631\times 6^3\right)e^{2.992\,i}$$

$$e^{6\times 0.498666\,i}\left(i\,(-1)\,167.144+250.047\times 6-6^2\times 145.471\,i-10.3631\times 6^3\right)+$$
$$6^2\left(i\,(-1)\,249.38-82.9047\times 6+6^2\times 5.16771\,i\right)\mathrm{Ei}(6\times 0.498666\,i)=$$
$$\left(-E_1(-2.992\,i)-\log(-2.992\,i)+\frac{1}{2}\left(\log(2.992\,i)-\log\left(\frac{1}{2.992\,i}\right)\right)\right)$$
$$6^2\left(-497.428-249.38\,i+5.16771\,i\,6^2\right)+$$
$$\left(1500.28-167.144\,i-145.471\,i\,6^2-10.3631\times 6^3\right)e^{2.992\,i}$$

$\mathrm{li}(x)$ is the logarithmic integral

$\Gamma(a,\,x)$ is the incomplete gamma function

$\log(x)$ is the natural logarithm

$E_n(x)$ is the exponential integral E

Series representations

$$e^{6\times 0.498666\,i}\left(i\,(-1)\,167.144+250.047\times 6-6^2\times 145.471\,i-10.3631\times 6^3\right)+$$
$$6^2\left(i\,(-1)\,249.38-82.9047\times 6+6^2\times 5.16771\,i\right)\mathrm{Ei}(6\times 0.498666\,i)=$$
$$e^{2.992\,i}\,(-738.148-5404.1\,i)+36\,(-497.428-63.3424\,i)$$
$$\left(\gamma+\frac{1}{2}\left(-\log\left(\frac{0.334225}{i}\right)+\log(2.992\,i)\right)+\sum_{k=1}^{\infty}\frac{2.992^k\,i^k}{k\,k!}\right)$$

$$e^{6\times 0.498666\,i}\left(i\,(-1)\,167.144+250.047\times 6-6^2\times 145.471\,i-10.3631\times 6^3\right)+$$
$$6^2\left(i\,(-1)\,249.38-82.9047\times 6+6^2\times 5.16771\,i\right)\mathrm{Ei}(6\times 0.498666\,i)=$$
$$e^{2.992\,i}\,(-738.148-5404.1\,i)-1140.16\,(7.853+i)$$
$$\left(2\,\gamma-\log\left(\frac{0.334225}{i}\right)+\log(2.992\,i)-2\,\mathcal{A}^{2.992\,i}\sum_{k=1}^{\infty}\sum_{j=1}^{k}\frac{(-2.992)^k\,i^k}{j\,k!}\right)$$

$$e^{6\times 0.498666\,i}\left(i\,(-1)\,167.144+250.047\times 6-6^2\times 145.471\,i-10.3631\times 6^3\right)+$$
$$6^2\left(i\,(-1)\,249.38-82.9047\times 6+6^2\times 5.16771\,i\right)\mathrm{Ei}(6\times 0.498666\,i)=$$
$$e^{2.992\,i}\,(-738.148-5404.1\,i)-$$
$$2280.33\,(7.853+i)\left(\gamma+\log(2.992\,i)-\left(\begin{cases}\pi\,\mathcal{A} & \text{False}\\ 0 & \text{otherwise}\end{cases}\right)+\sum_{k=1}^{\infty}\frac{2.992^k\,i^k}{k\,k!}\right)$$

$n!$ is the factorial function

γ is the Euler-Mascheroni constant

arg(z) is the complex argument

Integral representation

$$e^{6\times 0.498666\,i}\left(i\,(-1)\,167.144+250.047\times 6-6^2\times 145.471\,i-10.3631\times 6^3\right)+$$
$$6^2\left(i\,(-1)\,249.38-82.9047\times 6+6^2\times 5.16771\,i\right)\mathrm{Ei}(6\times 0.498666\,i)=$$
$$e^{2.992\,i}\,(-738.148-5404.1\,i)+36\,(-497.428-63.3424\,i)$$
$$\left(\gamma+\int_0^{2.992\,i}\frac{-1+\mathcal{A}^t}{t}\,dt+\frac{1}{2}\left(-\log\left(\frac{0.334225}{i}\right)+\log(2.992\,i)\right)\right)$$

From which:

(1/(11+3))*((e^((0.498666 i) 6) (-167.144 i + 250.047*6 - (145.471 i) 6^2 - 10.3631 6^3) + 6^2 (-249.38 i - 82.9047 6 + (5.16771 i) 6^2) Ei((0.498666 i) 6)))-47i+e*i-1/2*i

Input interpretation

$$\frac{1}{11+3}\left(e^{(0.498666\,i)\times 6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\times 6^2+6^3\times(-10.3631)\right)+\right.$$
$$6^2\left(-249.38\,i+6\times(-82.9047)+(5.16771\,i)\times 6^2\right)$$
$$\left.\mathrm{Ei}((0.498666\,i)\times 6)\right)-47\,i+e\,i-\frac{1}{2}\,i$$

Ei(x) is the exponential integral Ei

i is the imaginary unit

Result

510.165… −
4064.18… i

(using the principal branch of the logarithm for complex exponentiation)

Alternate complex forms

$510.165-4064.18\,i$

$4096.08\,(\cos(-1.44592) + i\sin(-1.44592))$

$4096.08\,e^{-1.44592\,i}$

Polar coordinates

$r = 4096.08$ (radius), $\theta = -1.44592$ (angle)

$4096.08 \approx 4096$

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternative representations

$$\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}=-\frac{95\,i}{2}+e\,i+\frac{1}{14}\left(\mathrm{li}\left(e^{2.992\,i}\right)6^2\left(-497.428-249.38\,i+5.16771\,i\,6^2\right)+\left(1500.28-167.144\,i-145.471\,i\,6^2-10.3631\times 6^3\right)e^{2.992\,i}\right)$$

$$\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}=-\frac{95\,i}{2}+e\,i+\frac{1}{14}\left(\left(-\Gamma(0,-2.992\,i)-\log(-2.992\,i)+\frac{1}{2}\left(\log(2.992\,i)-\log\left(\frac{1}{2.992\,i}\right)\right)\right)6^2\left(-497.428-249.38\,i+5.16771\,i\,6^2\right)+\left(1500.28-167.144\,i-145.471\,i\,6^2-10.3631\times 6^3\right)e^{2.992\,i}\right)$$

$$\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}=-\frac{95\,i}{2}+e\,i+\frac{1}{14}\left(\left(-E_1(-2.992\,i)-\log(-2.992\,i)+\frac{1}{2}\left(\log(2.992\,i)-\log\left(\frac{1}{2.992\,i}\right)\right)\right)6^2\left(-497.428-249.38\,i+5.16771\,i\,6^2\right)+\left(1500.28-167.144\,i-145.471\,i\,6^2-10.3631\times 6^3\right)e^{2.992\,i}\right)$$

$\mathrm{li}(x)$ is the logarithmic integral

$\Gamma(a, x)$ is the incomplete gamma function

$\log(x)$ is the natural logarithm

$E_n(x)$ is the exponential integral E

Series representations

$$\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}=-\frac{95\,i}{2}+e\,i-386.007\,e^{2.992\,i}\,(0.13659+i)-81.4403\,(7.853+i)\left(2\,\gamma-\log\left(\frac{0.334225}{i}\right)+\log(2.992\,i)-2\,\mathcal{A}^{2.992\,i}\sum_{k=1}^{\infty}\sum_{j=1}^{k}\frac{(-2.992)^k\,i^k}{j\,k!}\right)$$

$$\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}=-1279.1\,\gamma-52.7248\,e^{2.992\,i}-\frac{95\,i}{2}-162.881\,\gamma\,i+e\,i-386.007\,e^{2.992\,i}\,i+639.551\log\left(\frac{0.334225}{i}\right)+81.4403\,i\log\left(\frac{0.334225}{i}\right)-639.551\log(2.992\,i)-81.4403\,i\log(2.992\,i)+\sum_{k=1}^{\infty}\frac{2.992^k\,(-1279.1-162.881\,i)\,i^k}{k\,k!}$$

$$\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}=-\frac{95\,i}{2}+e\,i-386.007\,e^{2.992\,i}\,(0.13659+i)-162.881\,(7.853+i)\left(\gamma+\log(2.992\,i)-\left(\begin{cases}\pi\,\mathcal{A} & \text{False}\\ 0 & \text{otherwise}\end{cases}\right)+\sum_{k=1}^{\infty}\frac{2.992^k\,i^k}{k\,k!}\right)$$

$n!$ is the factorial function

γ is the Euler-Mascheroni constant

$\arg(z)$ is the complex argument

Integral representation

$$\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}=-1279.1\,\gamma-52.7248\,e^{2.992\,i}-\frac{95\,i}{2}-162.881\,\gamma\,i+e\,i-386.007\,e^{2.992\,i}\,i+\int_0^{2.992\,i}\frac{1279.1+162.881\,i-1279.1\,\mathcal{A}^t-162.881\,i\,\mathcal{A}^t}{t}\,dt+639.551\log\left(\frac{0.334225}{i}\right)+81.4403\,i\log\left(\frac{0.334225}{i}\right)-639.551\log(2.992\,i)-81.4403\,i\log(2.992\,i)$$

27*sqrt((1/(11+3))*((e^((0.498666 i) 6) (-167.144 i + 250.047*6 - (145.471 i) 6^2 - 10.3631 6^3) + 6^2 (-249.38 i - 82.9047 6 + (5.16771 i) 6^2) Ei((0.498666 i) 6)))-47i+e*i-1/2*i)+1-1/Pi+1/2

Input interpretation

$$27\sqrt{\left(\frac{1}{11+3}\left(e^{(0.498666\,i)\times 6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\times 6^2+6^3\times(-10.3631)\right)+6^2\left(-249.38\,i+6\times(-82.9047)+(5.16771\,i)\times 6^2\right)\mathrm{Ei}((0.498666\,i)\times 6)\right)-47\,i+e\,i-\frac{1}{2}\,i\right)}+1-\frac{1}{\pi}+\frac{1}{2}$$

Ei(x) is the exponential integral Ei

i is the imaginary unit

Result

1296.93… −
1143.27… i

(using the principal branch of the logarithm for complex exponentiation)

Alternate complex forms

$$1728.9\,(\cos(-0.722509)+i\sin(-0.722509))$$

$$1728.9\,e^{-0.722509\,i}$$

Polar coordinates

$r = 1728.9$ (radius), $\theta = -0.722509$ (angle)

1728.9

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2.

Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternative representations

$$27\sqrt{\left(\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}\right)+1-\frac{1}{\pi}+\frac{1}{2}=\frac{3}{2}-\frac{1}{\pi}+27\sqrt{\left(-\frac{95\,i}{2}+e\,i+\frac{1}{14}\left(\mathrm{li}\left(e^{2.992\,i}\right)6^2\left(-497.428-249.38\,i+5.16771\,i\,6^2\right)+\left(1500.28-167.144\,i-145.471\,i\,6^2-10.3631\times 6^3\right)e^{2.992\,i}\right)\right)}$$

$$27\sqrt{\left(\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}\right)+1-\frac{1}{\pi}+\frac{1}{2}=\frac{3}{2}-\frac{1}{\pi}+27\sqrt{\left(-\frac{95\,i}{2}+e\,i+\frac{1}{14}\left(\left(-\Gamma(0,-2.992\,i)-\log(-2.992\,i)+\frac{1}{2}\left(\log(2.992\,i)-\log\left(\frac{1}{2.992\,i}\right)\right)\right)6^2\left(-497.428-249.38\,i+5.16771\,i\,6^2\right)+\left(1500.28-167.144\,i-145.471\,i\,6^2-10.3631\times 6^3\right)e^{2.992\,i}\right)\right)}$$

$$27\sqrt{\left(\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}\right)+1-\frac{1}{\pi}+\frac{1}{2}=\frac{3}{2}-\frac{1}{\pi}+27\sqrt{\left(-\frac{95\,i}{2}+e\,i+\frac{1}{14}\left(\left(-E_1(-2.992\,i)-\log(-2.992\,i)+\frac{1}{2}\left(\log(2.992\,i)-\log\left(\frac{1}{2.992\,i}\right)\right)\right)6^2\left(-497.428-249.38\,i+5.16771\,i\,6^2\right)+\left(1500.28-167.144\,i-145.471\,i\,6^2-10.3631\times 6^3\right)e^{2.992\,i}\right)\right)}$$

li(x) is the logarithmic integral

$\Gamma(a, x)$ is the incomplete gamma function

log(x) is the natural logarithm

$E_n(x)$ is the exponential integral E

Series representations

$$27\sqrt{\left(\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}\right)+1-\frac{1}{\pi}+\frac{1}{2}=\frac{3}{2}-\frac{1}{\pi}+27\sqrt{\left(-1+e^{2.992\,i}\,(-52.7248-386.007\,i)-47.5\,i+e\,i+(-1279.1-162.881\,i)\,\mathrm{Ei}(2.992\,i)\right)}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+e^{2.992\,i}\,(-52.7248-386.007\,i)-47.5\,i+e\,i+(-1279.1-162.881\,i)\,\mathrm{Ei}(2.992\,i)\right)^{-k}$$

$$27\sqrt{\left(\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}\right)+1-\frac{1}{\pi}+\frac{1}{2}=\frac{3}{2}-\frac{1}{\pi}+27\sqrt{\left(-1+e^{2.992\,i}\,(-52.7248-386.007\,i)-47.5\,i+e\,i+(-1279.1-162.881\,i)\,\mathrm{Ei}(2.992\,i)\right)}\sum_{k=0}^{\infty}\frac{1}{k!}(-1)^k\left(-1+e^{2.992\,i}\,(-52.7248-386.007\,i)-47.5\,i+e\,i+(-1279.1-162.881\,i)\,\mathrm{Ei}(2.992\,i)\right)^{-k}\left(-\frac{1}{2}\right)_k$$

$$27\sqrt{\left(\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}\right)+1-\frac{1}{\pi}+\frac{1}{2}=\frac{3}{2}-\frac{1}{\pi}+27\exp\left(\pi\,\mathcal{A}\left\lfloor\frac{1}{2\pi}\arg\left(e^{2.992\,i}\,(-52.7248-386.007\,i)-47.5\,i+e\,i-x+(-1279.1-162.881\,i)\,\mathrm{Ei}(2.992\,i)\right)\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{1}{k!}(-1)^k\,x^{-k}\left(e^{2.992\,i}\,(-52.7248-386.007\,i)-47.5\,i+e\,i-x+(-1279.1-162.881\,i)\,\mathrm{Ei}(2.992\,i)\right)^k\left(-\frac{1}{2}\right)_k\quad\text{for}\ (x\in\mathbb{R}\ \text{and}\ x<0)$$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

$\mathbb{R}$ is the set of real numbers

Integral representation

$$27\sqrt{\left(\frac{1}{11+3}\left(e^{(0.498666\,i)\,6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\,6^2-10.3631\times 6^3\right)+6^2\left(-249.38\,i-82.9047\times 6+(5.16771\,i)\,6^2\right)\mathrm{Ei}((0.498666\,i)\,6)\right)-i\,47+e\,i-\frac{i}{2}\right)+1-\frac{1}{\pi}+\frac{1}{2}=\frac{3}{2}-\frac{1}{\pi}+27\sqrt{\left(-\frac{95\,i}{2}+e\,i+\frac{1}{14}\left(e^{2.992\,i}\,(-738.148-5404.1\,i)+36\,(-497.428-63.3424\,i)\left(\gamma+\int_0^{2.992\,i}\frac{-1+\mathcal{A}^t}{t}\,dt+\frac{1}{2}\left(-\log\left(\frac{0.334225}{i}\right)+\log(2.992\,i)\right)\right)\right)\right)}$$

γ is the Euler-Mascheroni constant

(27√((1/(11+3))*((e^((0.498666 i)6)(-167.144 i+250.047*6-(145.471 i) 36-10.3631 6^3)+36(-249.38 i-82.9047 6+(5.16771 i)36) Ei((0.49866 i)6)))-47i+e*i-1/2*i)+1-1/Pi+1/2)^1/15+(MRB cons)^(1-1/(4π)+π)

Input interpretation

$$\left(27\sqrt{\left(\frac{1}{11+3}\left(e^{(0.498666\,i)\times 6}\left(-167.144\,i+250.047\times 6-(145.471\,i)\times 36+6^3\times(-10.3631)\right)+36\,(-249.38\,i+6\times(-82.9047)+(5.16771\,i)\times 36)\,\mathrm{Ei}((0.49866\,i)\times 6)\right)-47\,i+e\,i-\frac{1}{2}\,i\right)+1-\frac{1}{\pi}+\frac{1}{2}\right)\wedge(1/15)+{C_{\mathrm{MRB}}}^{1-1/(4\pi)+\pi}$$

$\mathrm{Ei}(x)$ is the exponential integral Ei

i is the imaginary unit

C_{MRB} is the MRB constant

Result

1.64303… −
0.0791474… i

(using the principal branch of the logarithm for complex exponentiation)

Alternate complex forms

$1.64303 - 0.0791474\,i$

$1.64493\,(\cos(-0.0481345) + i\sin(-0.0481345))$

$1.64493\,e^{-0.0481345\,i}$

Polar coordinates

$r = 1.64493$ (radius), $\theta = -0.0481345$ (angle)

1.64493 ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Observations and conclusions

Electromagnetic phenomena accompany periods of earthquakes, and which at that time often take the place of telluric motions. In addition to this, they predominate every year during one or two months which chooses between March and May or, at the latest, enters June and July. **The activity of the sun is the center of electromagnetic phenomena** (Michele Stefano De Rossi – "Meteorologia Endogena")

Recall that tidal force (generally used in the plural, tidal forces or tidal forces, and also with the expression tidal effects) is a secondary effect of the **force of gravity**. Tidal effects from different bodies can add up, as in the case of the alignment between the Moon and the Sun which gives rise to intense syzygial tides.

The undoubted correlation that Prof. De Rossi felt between the Corleone earthquakes and those of Monte Baldo last year moved me to pay special attention to the latter as well. Rummaging through the scientific yearbooks, I found the precise dates of the strongest earthquakes felt in 1866 on the slopes of Monte Baldo, namely: 13 June, 11 August and 7-8 November, which correspond to the new moons; in 1870 seismic activity reawakened there, but I don't know the dates; in 1876 the first strong shock occurred on April 23, that is, on the eve of the new moon; with the perigee (which took place on the 26th) the shocks prepared by the new moon continued until the 29th; then the frequency decreased until May 4th and it already seemed to have left those populations in peace; except that the next coincidence of the new moon with the perigee and with a strong northern declination (in which position, as I already said, one of the two passages to the meridian is an energetic occasion for an earthquake) provided me with such a clue of awakening, probably on a greater extent of land , that here I prepared myself for careful surveillance, so as not to miss the most important phases of the phenomenon, when this happened. I mentioned this probability to Prof. Don Timoteo Bertelli of Florence in my letter of May 1st and to Prof. Goiran of Verona in a letter of the same 12th. The critical day otherwise passed peacefully in Trieste; not so in Monte Baldo, where the tremors resumed on the 22nd and continued on the 23rd, to be repeated on the 29th; at the same time in Corleone the activity, which had seemed almost extinguished since the 10th, was reawakened with a shock on the 20th, one on the 21st, four on the 24th and with great energy on the 25th. On May 22nd, the eve of the new moon, the very strong earthquake also occurred of Spoleto and at the time of the new moon in question there was, it can be said, no region of the Apennines in which seismic activity did not manifest itself with greater or lesser force, as can be seen from the bulletin.

In Monte Baldo there was a truce during June; in July the tremors resumed the day after the full moon and continued thereafter without interruption; in the following months tremors were noted on August 7th, September 5th, October 9th and November 4th, that is, almost always one or two days after the full moon. It is remarkable that on May 22nd and 23rd, while the rest of Italy was shaking, there was a truce in Corleone and then an immediate awakening, and the truce that occurred in the new moons following Monte Baldo in the face of energy is equally significant. manifested itself at the same time as Corleone, where the endogenous forces were transported by geological-mechanical effects, which it is not my task to erudite. In 1870, as far as I can remember, the seismic period of Monte Baldo put an end to that of Monte Nevoso (Julian Alps). This began on February 28th with a strong tremor at 12.20 pm; the next day the shocks were repeated and so also on the day of the new moon, March 2, and the following; after a fifteen-day truce a shock was felt at the full moon; then there were other tremors, the dates of which I could not know; those that came to my attention, and were the strongest, occurred on April 28th (the eve of the new moon), on May 10th, on May 15th (full moon), on June 2nd (near the new moon) and several between the 13th and the 19th. June (full moon period). Then the activity died down there and arose in Monte Baldo. Monte Nevoso was frequently subject to earthquakes; in relatively recent times there was a long period from November 1750 to May 1753; and in 1838 the populations remained in suspense for three months. That local area includes the city of Rijeka; and even in the small earthquakes, which occur here from time to time, I have observed a decided prevalence of syzygies. From this we see that some seismic periods, although limited within very narrow boundaries, can be the effect of a large telluric cause. I took the Corleone period into special consideration, because this is one of the few whose phases have been carefully studied and from which there is a sufficiently large number of shocks to draw positive consequences. There was another seismic period of recent memory and well studied, that of Belluno; the existing relationship between it and the lunar positions has no need of my demonstrations, because the illustrious Falb proved it since he predicted, based on his theories, the return of the phenomenon even during the course of the period itself.

Perhaps all the seismic phenomena that occur in Italy have as their cause, if not direct, at least determining, the action of the stars, but while on the one hand the lack of sufficient observations does not allow very extensive studies, on the other hand the translocation, which often happens, seismic centers distract the attention of investigators so as not to allow them to glimpse the effects of a great common cause in isolated phenomena.

It is desirable that the invitation made repeatedly by Prof. Cav. De Rossi, in order to obtain the greatest possible number of reports on seismic phenomena, must be listened to by those who have the progress of science at heart and that no one abstains from communicating even crude observations of such phenomena, the memory of which without this could be lost to the detriment of science. (**DELL' ATTRAZIONE LUNI- SOLARE IN RELAZIONE COI FENOMENI MAREO – SISMICI** - STUDI DIMOSTRATIVI DI GIULIO GRABLOVITZ – 1877)

In conclusion:

While **the activity of the sun is the center of electromagnetic phenomena,** the tidal force, hence the luni-solar attraction, is a secondary effect of the **force of gravity**. The **aurora borealis**, for example, is a phenomenon visually characterized by luminous bands that take on a wide range of shapes and colours, rapidly changing in time and space, usually red-green-blue in colour, called auroral arcs, caused from the interaction of charged particles (protons and electrons) of solar origin (solar wind) with the terrestrial ionosphere (atmosphere between 100-500 km): these particles excite the atoms of the atmosphere which, subsequently de-energizing, emit light of various lengths 'wave. Solar activity is a source of emission of **electromagnetic waves** and **electrically charged particles**, the luni-solar attraction, is a secondary effect of the **force of gravity**. It is therefore possible to hypothesize a connection, albeit indirect, between these phenomena and "**gravitational waves**" which, among other things, travel at a speed equal to c (speed of light), as well as **electromagnetic waves**. Thus, there is a purely mathematical connection between seismic waves and gravitational waves.

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

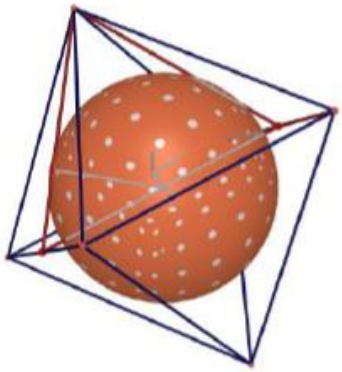


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\ l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.141939571526584308924330732196162632677513386811659044682541739 3

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$
$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

4096 = 64^2 , (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$).

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.61805\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^8\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^8\right)^k}{k!}\right)\quad\text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$
$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi e^{0} \approx 3.1416$ (real, principal root)

$\pi e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1\sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003$ (real, principal root)

$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003$ (real root)

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{8}{\pi^2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\;\sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\mathrm{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13

…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\Bigg/\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}(C\times \mathrm{R}\times 2.33\cdot 10^{-13})}}\cong 1.61803398\ldots=\frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.618035912348264235440174408834709854254527350840173356306481810 7

…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\, x^2\, y\, z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$) is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.6018401361\times 10^{-24}\right)}}$$

1.618032997307532491506757016629746746422577260892967140791939590 3
…

1.6180329973075…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times10^{-35}}{1.1056\times10^{-52}}\times 1729\times 4.4525642121\times 10^{-24}\right)}}$$

Result

1.644932352102092130483898983704151168876621841655166877914166033 8
…

1.64493235210209213…. ≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times10^{-35}}{1.1056\times10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

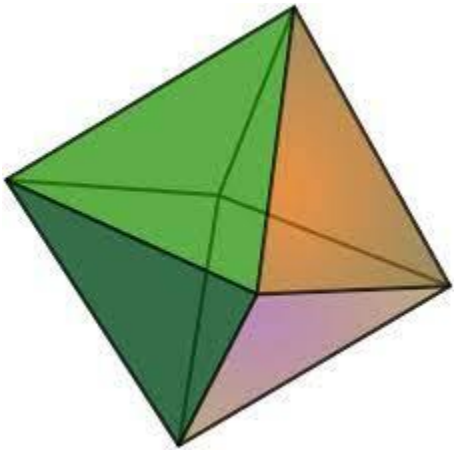
Result

3.14159225731469939939950039231605796469731171781644423955790024797

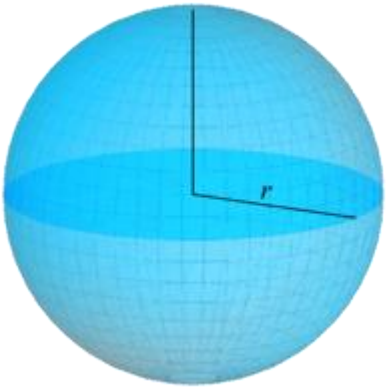
…

3.14159225731469…. ≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find *a*, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

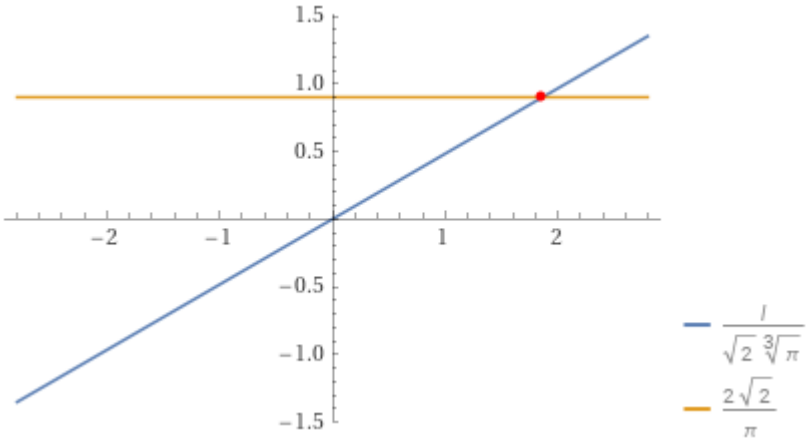
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,3}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256x^8 + 95\,744x^7 - 3\,248\,750\,080x^6 - 914\,210\,725\,504x^5 + 15\,498\,355\,554\,921\,184x^4 + 2\,911\,478\,392\,539\,914\,656x^3 - 32\,941\,144\,911\,224\,677\,091\,680x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi =$$
$$\left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

1.64381856858…. $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\text{^}\,(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\wedge(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\wedge(1/15)\right)$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

–5.010882647757...

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+...}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\,\sqrt{6}}\right)^2\right\} = 0$$

$$\text{for } b = -\frac{226\,802\,245}{18\,480\,874}$$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

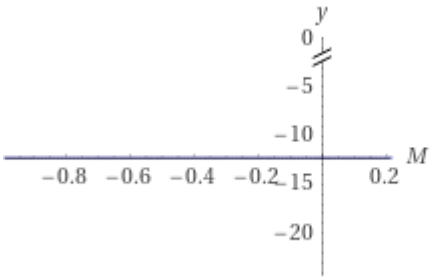
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

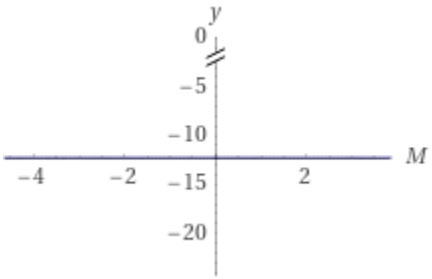
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774 \times 10^{-7} \sqrt{M^4}}{M^2} - 12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774 \times 10^{-7} \sqrt{M^4}}{M^2} - 12.2723\right) + O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

$$-12.2723$$

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545 \times 10^{-10} \sqrt{M^4} - 0.054323\, M^2\right)}{M^2}\right) = \frac{3.55271 \times 10^{-15}}{M}$$

Indefinite integral:

$$\int \frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM = \frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\} = -\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\} = -\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2} = -12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM = 0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

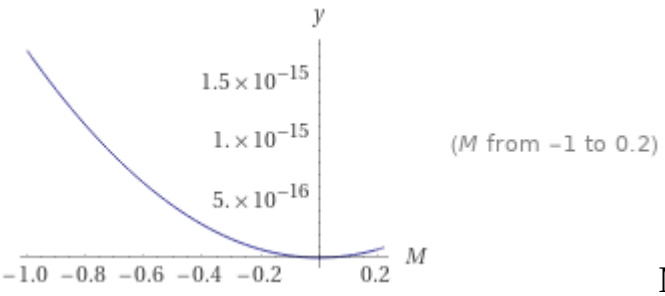
Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

Result:

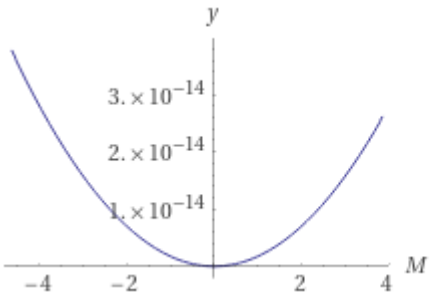
0

Plots: **(possible mathematical connection with an open string)**



M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O(M^{62194})$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{1}{3}M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2\left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^{-16}

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times 10^{-17}$

7.021621519159*10^{-17}

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

1.57986484181*10^-14

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 2^2 + 6.58545 \times 10^{-10}\sqrt{2^4}\right)}{2^2} + 1\right)^2 \times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

7.021621519*10^-15

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_{0}}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)])))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\,\hat{}\,(1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

5.729475 * 10^{-35} Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

1.820306 * 10^{61} V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

5.975498*10^{-8} V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

1.042940*10^{27} V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

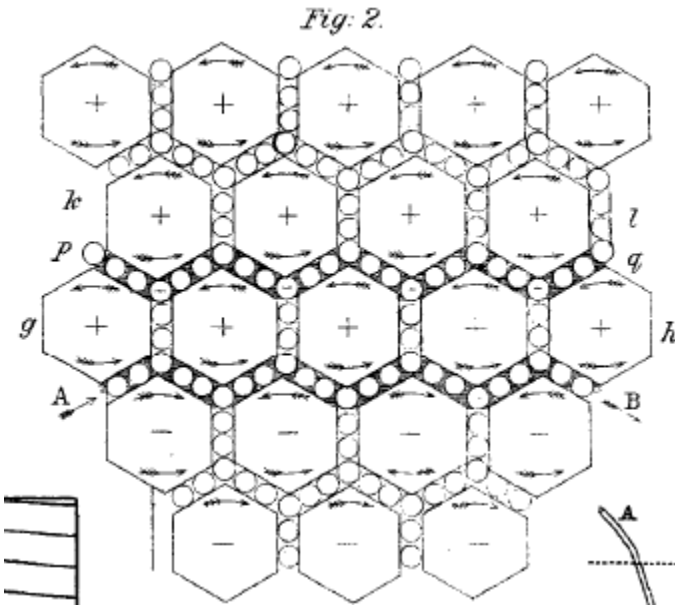
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

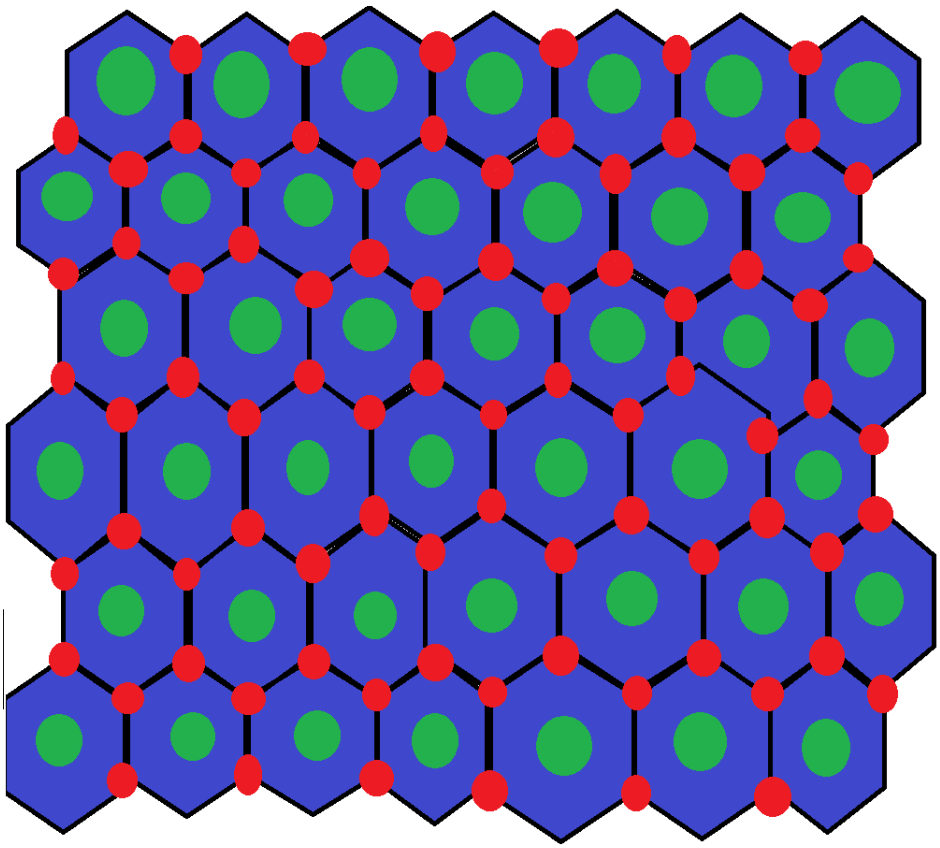
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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A Number Theoretic Analysis of the Enthalpy, Enthalpy Energy Density, Thermodynamic Volume, and the Equation of State of a Modified White Hole, and the Implications to the Quantum Vacuum Spacetime, Matter Creation and the Planck Frequency. - *Nardelli, M., Kubeka, A.S. and Amani, A.* (2024) - Journal of Modern Physics , 15, 1-50. - https://doi.org/10.4236/jmp.2024.151001

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Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On some equations concerning the seismology and the calculation relating to the tides and solar eclipses. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory VII

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper (part VII), we analyze some equations concerning the seismology and the calculation relating to the tides and solar eclipses. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory

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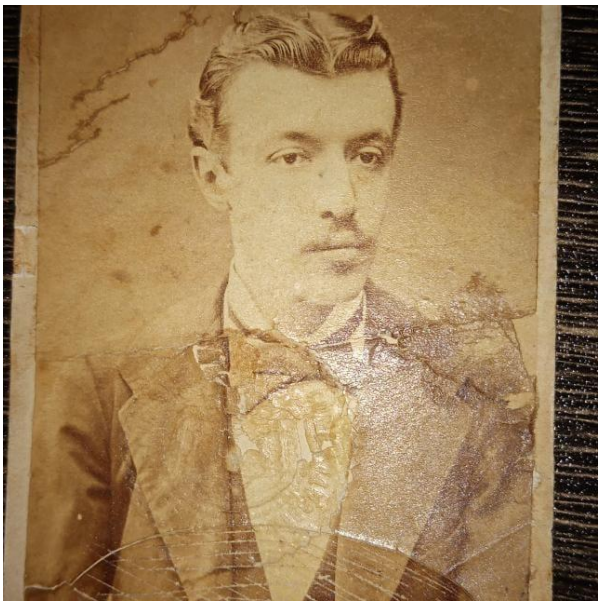
Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

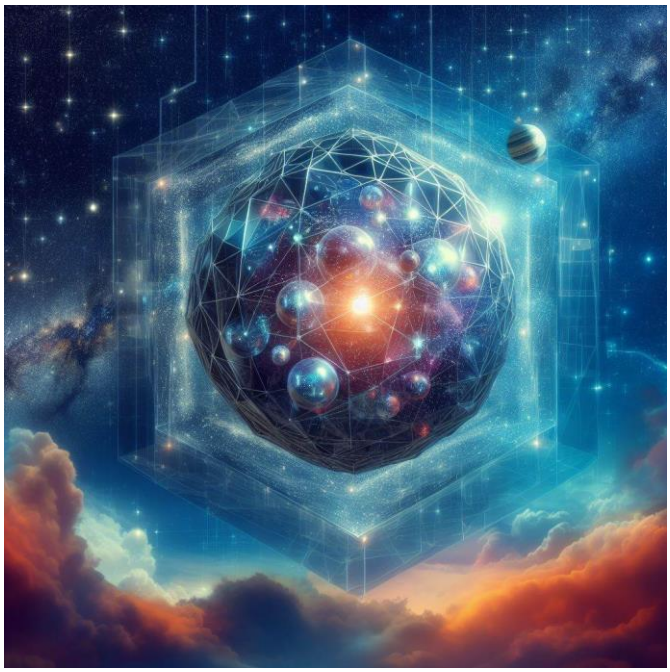
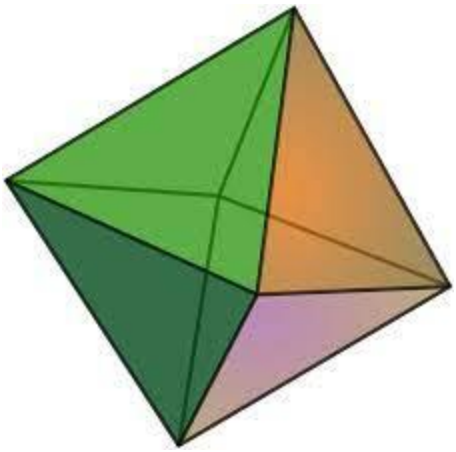
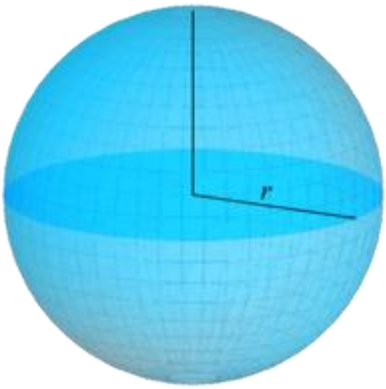


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\pi x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$l = 0, \quad x = 0$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt{2}\ \sqrt[3]{\pi}\right) = \log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\ \pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

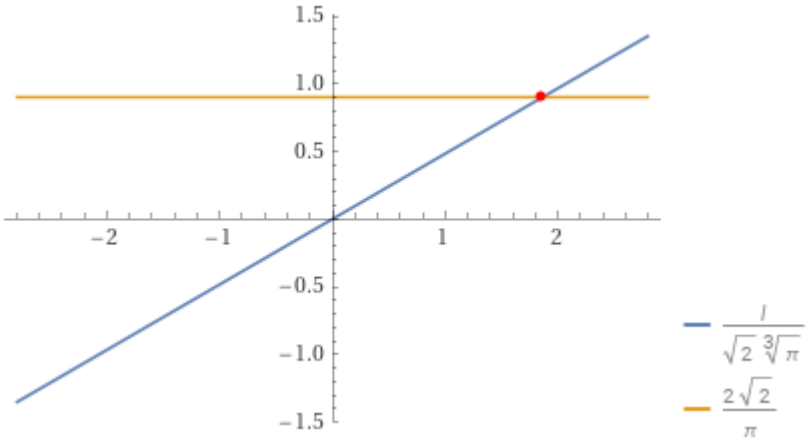
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

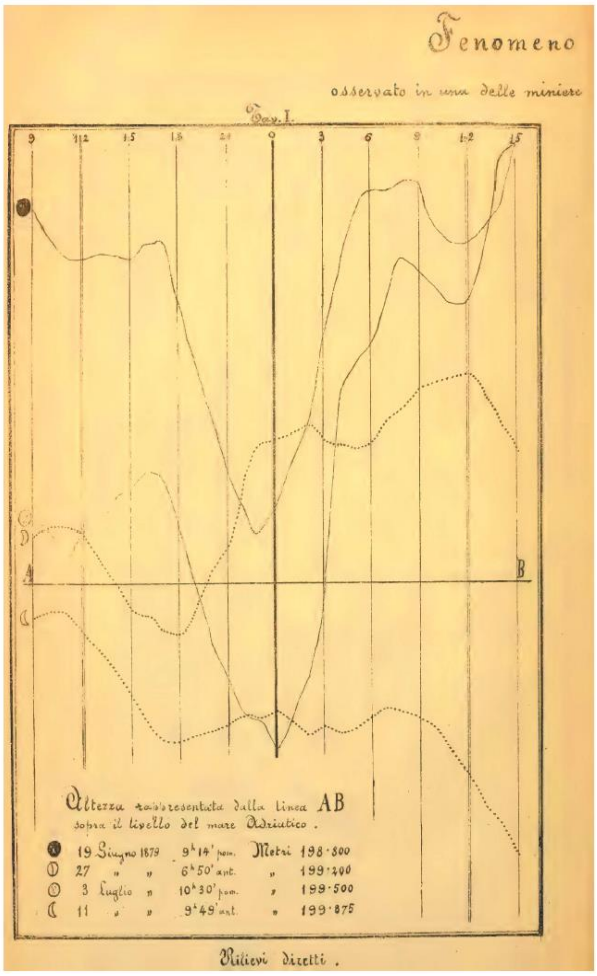
Plot

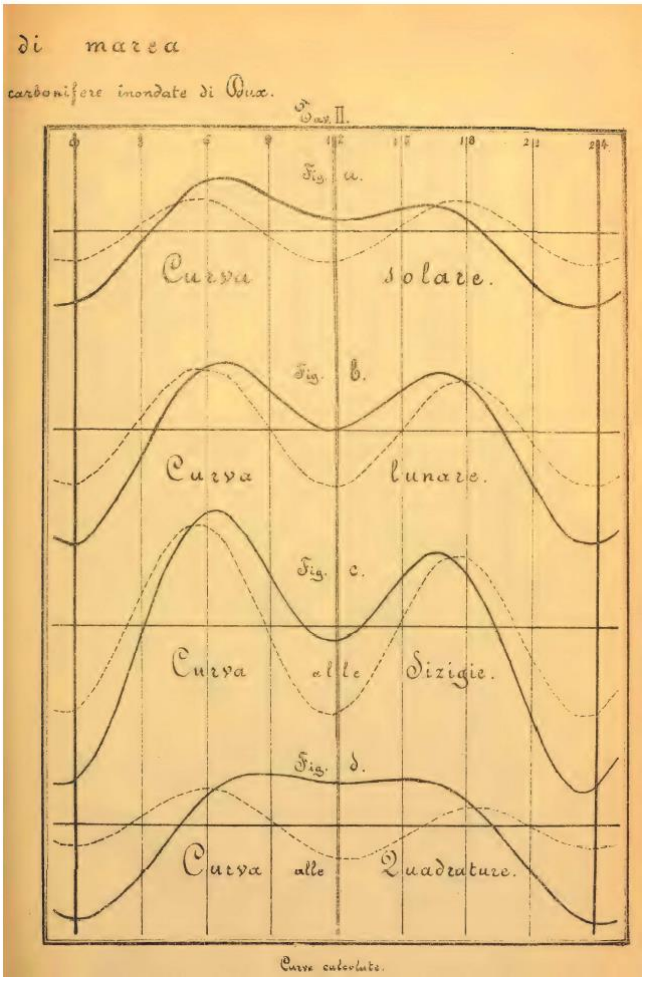


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

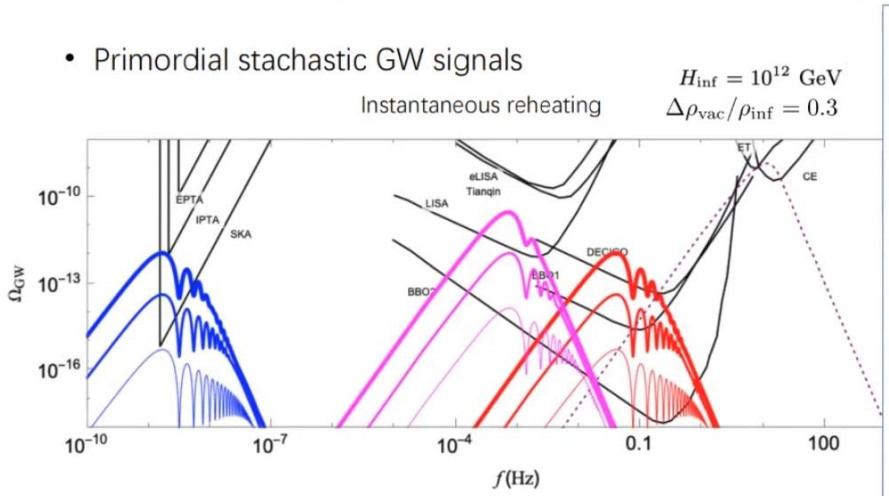

di marea
carbonifere inondate di Pux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

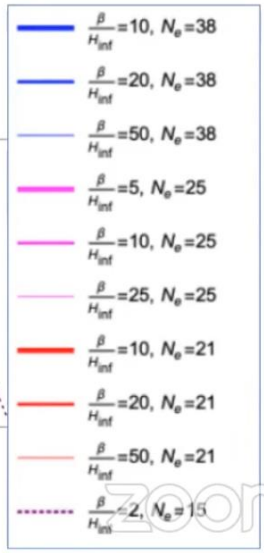
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

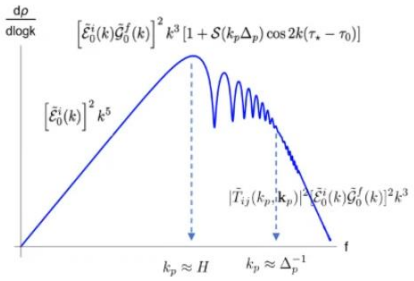
Comparison between primary GW and secondary GW

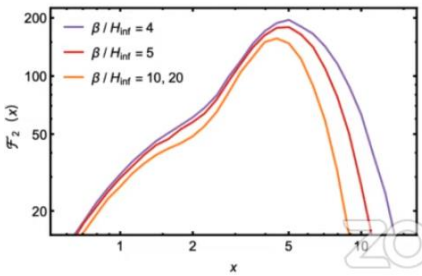
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

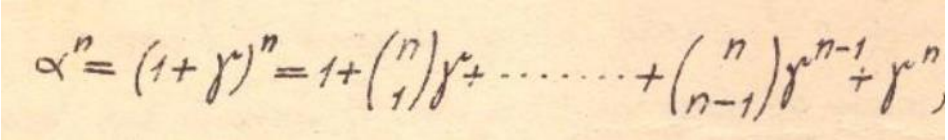
$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





From

Renato Caccioppoli – **Analisi Matematica I**



We consider:

(1+γ)^n = 1+Binomial [n, 1] * γ + Binomial [n, n-1] * γ^(n-1) + γ^n

Input

$$1+\binom{n}{1}\gamma+\binom{n}{n-1}\gamma^{n-1}+\gamma^n$$

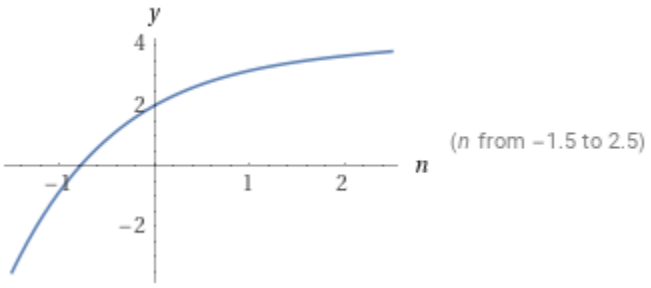
$\binom{n}{m}$ is the binomial coefficient

γ is the Euler-Mascheroni constant

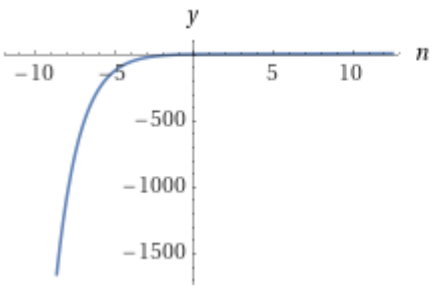
Exact result

$$\gamma^{n-1}\,n+\gamma\,n+\gamma^n+1$$

Plots (figures that can be related to the open strings)



(n from −1.5 to 2.5)



(n from −11.5 to 12.5)

Alternate forms

$$\left(\gamma^{n-1}+\gamma\right)n+\gamma^n+1$$

$$\gamma\, n+\gamma^{n-1}\,(n+\gamma)+1$$

$$\frac{\gamma^n\, n+\gamma^2\, n+\gamma^{n+1}+\gamma}{\gamma}$$

Root

$$n\approx -0.782952$$

Series expansion at n=0

$$2+n\left(\frac{1}{\gamma}+\gamma+\log(\gamma)\right)+\frac{1}{2}\,n^2\log(\gamma)\left(\frac{2}{\gamma}+\log(\gamma)\right)+\frac{n^3\log^2(\gamma)\,(3+\gamma\log(\gamma))}{6\,\gamma}+\frac{n^4\log^3(\gamma)\,(4+\gamma\log(\gamma))}{24\,\gamma}+O\left(n^5\right)$$

(Taylor series)

$\log(x)$ is the natural logarithm

Derivative

$$\frac{d}{dn}\left(1+\binom{n}{1}\gamma+\binom{n}{n-1}\gamma^{n-1}+\gamma^n\right)=\gamma^{n-1}\,(n\log(\gamma)+1)+\gamma^n\log(\gamma)+\gamma$$

Indefinite integral

$$\int\left(1+\gamma^n+\gamma\, n+\gamma^{-1+n}\, n\right)dn=\frac{\gamma\, n^2}{2}+n+\frac{\gamma^{n-1}\,(\gamma\log(\gamma)-1)}{\log^2(\gamma)}+\frac{\gamma^{n-1}\, n}{\log(\gamma)}+\text{constant}$$

Alternative representations

$$1+\binom{n}{1}\gamma+\binom{n}{n-1}\gamma^{n-1}+\gamma^n=1+\gamma^n+\frac{\gamma\, n!}{1!\,(-1+n)!}+\frac{n!\,\gamma^{-1+n}}{1!\,(-1+n)!}$$

$$1+\binom{n}{1}\gamma+\binom{n}{n-1}\gamma^{n-1}+\gamma^n=1+\gamma^n+\frac{\gamma\,\Gamma(1+n)}{\Gamma(2)\,\Gamma(n)}+\frac{\Gamma(1+n)\,\gamma^{-1+n}}{\Gamma(2)\,\Gamma(n)}$$

$$1+\binom{n}{1}\gamma+\binom{n}{n-1}\gamma^{n-1}+\gamma^n=$$
$$1+\gamma\,((-1+n)+1;\,-1+n,\,1)+(1+(-1+n);\,1,\,-1+n)\,\gamma^{-1+n}+\gamma^n$$

$n!$ is the factorial function

$\Gamma(x)$ is the gamma function

$(n_1+\ldots+n_k\,;n_1,\ldots,n_k)$ is the multinomial coefficient

Series representations

$$1+\binom{n}{1}\gamma+\binom{n}{n-1}\gamma^{n-1}+\gamma^n=$$
$$\frac{\sum_{k=2}^{\infty}\frac{(-1)^k\,\zeta(k)}{k}+n\left(\sum_{k=2}^{\infty}\frac{(-1)^k\,\zeta(k)}{k}\right)^2+n\left(\sum_{k=2}^{\infty}\frac{(-1)^k\,\zeta(k)}{k}\right)^n+\left(\sum_{k=2}^{\infty}\frac{(-1)^k\,\zeta(k)}{k}\right)^{1+n}}{\sum_{k=2}^{\infty}\frac{(-1)^k\,\zeta(k)}{k}}$$

$$1+\binom{n}{1}\gamma+\binom{n}{n-1}\gamma^{n-1}+\gamma^n=$$
$$\left(\sum_{k=1}^{\infty}\left(\frac{1}{k}-\log\left(1+\frac{1}{k}\right)\right)+n\left(\sum_{k=1}^{\infty}\left(\frac{1}{k}-\log\left(1+\frac{1}{k}\right)\right)\right)^2+n\left(\sum_{k=1}^{\infty}\left(\frac{1}{k}-\log\left(1+\frac{1}{k}\right)\right)\right)^n+\left(\sum_{k=1}^{\infty}\left(\frac{1}{k}-\log\left(1+\frac{1}{k}\right)\right)\right)^{1+n}\right)\Big/\left(\sum_{k=1}^{\infty}\left(\frac{1}{k}-\log\left(1+\frac{1}{k}\right)\right)\right)$$

$$1+\binom{n}{1}\gamma+\binom{n}{n-1}\gamma^{n-1}+\gamma^n=$$
$$\frac{1}{\sum_{k=2}^{\infty}\frac{(-1+k)(-1+\zeta(k))}{k}}\left(\sum_{k=2}^{\infty}\frac{(-1+k)(-1+\zeta(k))}{k}+n\left(\sum_{k=2}^{\infty}\frac{(-1+k)(-1+\zeta(k))}{k}\right)^2+\right.$$
$$\left.n\left(\sum_{k=2}^{\infty}\frac{(-1+k)(-1+\zeta(k))}{k}\right)^n+\left(\sum_{k=2}^{\infty}\frac{(-1+k)(-1+\zeta(k))}{k}\right)^{1+n}\right)$$

$\zeta(s)$ is the Riemann zeta function

Integral representations

$$1+\binom{n}{1}\gamma+\binom{n}{n-1}\gamma^{n-1}+\gamma^n=$$
$$\frac{\int_0^{\infty}\frac{-e^{-t}+\frac{1}{1+t}}{t}\,dt+n\left(\int_0^{\infty}\frac{-e^{-t}+\frac{1}{1+t}}{t}\,dt\right)^2+n\left(\int_0^{\infty}\frac{-e^{-t}+\frac{1}{1+t}}{t}\,dt\right)^n+\left(\int_0^{\infty}\frac{-e^{-t}+\frac{1}{1+t}}{t}\,dt\right)^{1+n}}{\int_0^{\infty}\frac{-e^{-t}+\frac{1}{1+t}}{t}\,dt}$$

$$1+\binom{n}{1}\gamma+\binom{n}{n-1}\gamma^{n-1}+\gamma^n=$$
$$-\frac{1}{\int_{-\infty}^{\infty}e^{-e^t+t}\,t\,dt}\left(n\left(-\int_{-\infty}^{\infty}e^{-e^t+t}\,t\,dt\right)^n-\int_{-\infty}^{\infty}e^{-e^t+t}\,t\,dt-\right.$$
$$\left.\left(-\int_{-\infty}^{\infty}e^{-e^t+t}\,t\,dt\right)^n\int_{-\infty}^{\infty}e^{-e^t+t}\,t\,dt+n\left(\int_{-\infty}^{\infty}e^{-e^t+t}\,t\,dt\right)^2\right)$$

$$1+\binom{n}{1}\gamma+\binom{n}{n-1}\gamma^{n-1}+\gamma^n=\frac{1}{\int_0^{\infty}\left(\frac{1}{-1+e^t}-\frac{e^{-t}}{t}\right)dt}$$
$$\left(\int_0^{\infty}\left(\frac{1}{-1+e^t}-\frac{e^{-t}}{t}\right)dt+n\left(\int_0^{\infty}\left(\frac{1}{-1+e^t}-\frac{e^{-t}}{t}\right)dt\right)^2+\right.$$
$$\left.n\left(\int_0^{\infty}\left(\frac{1}{-1+e^t}-\frac{e^{-t}}{t}\right)dt\right)^n+\left(\int_0^{\infty}\left(\frac{1}{-1+e^t}-\frac{e^{-t}}{t}\right)dt\right)^{1+n}\right)$$

From the indefinite integral result

$$\int\left(1+\gamma^n+\gamma\,n+\gamma^{-1+n}\,n\right)dn=\frac{\gamma\,n^2}{2}+n+\frac{\gamma^{n-1}\,(\gamma\log(\gamma)-1)}{\log^2(\gamma)}+\frac{\gamma^{n-1}\,n}{\log(\gamma)}+\text{constant}$$

we obtain:

n + (γ n^2)/2 + (γ^(-1 + n) n)/log(γ) + (γ^(-1 + n) (-1 + γ log(γ)))/(log^2(γ))

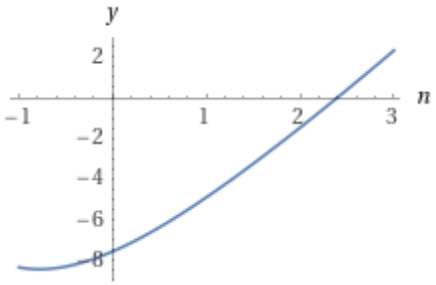
Input

$$n+\frac{1}{2}\left(\gamma n^2\right)+\frac{\gamma^{-1+n}\, n}{\log(\gamma)}+\frac{\gamma^{-1+n}\,(-1+\gamma\log(\gamma))}{\log^2(\gamma)}$$

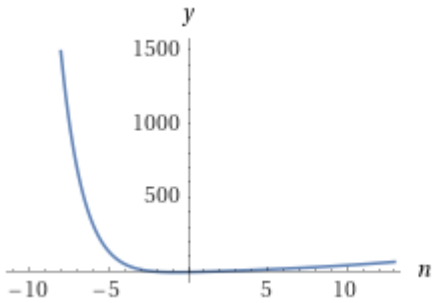
$\log(x)$ is the natural logarithm

γ is the Euler-Mascheroni constant

Plots (figures that can be related to the open strings)



(n from −1 to 3)



(n from −11 to 13)

Alternate forms

$$\frac{1}{2}\, n\,(\gamma n+2)+\frac{\gamma^{n-1}\,((n+\gamma)\log(\gamma)-1)}{\log^2(\gamma)}$$

$$\frac{1}{2}\,n\,(\gamma\,n+2)+\frac{\gamma^{n-1}\,(n\log(\gamma)-1+\gamma\log(\gamma))}{\log^2(\gamma)}$$

$$\frac{\gamma\,n^2}{2}-\frac{\gamma^{n-1}}{\log^2(\gamma)}+n\left(\frac{\gamma^{n-1}}{\log(\gamma)}+1\right)+\frac{\gamma^n}{\log(\gamma)}$$

Roots

$n\approx -2.45576$

$n\approx 2.39518$

Series expansion at n=0

$$\frac{\gamma\log(\gamma)-1}{\gamma\log^2(\gamma)}+2\,n+\frac{n^2\left(1+\gamma^2+\gamma\log(\gamma)\right)}{2\,\gamma}+\frac{n^3\log(\gamma)\,(2+\gamma\log(\gamma))}{6\,\gamma}+\frac{n^4\log^2(\gamma)\,(3+\gamma\log(\gamma))}{24\,\gamma}+O\left(n^5\right)$$

(Taylor series)

Derivative

$$\frac{d}{dn}\left(n+\frac{\gamma\,n^2}{2}+\frac{\gamma^{-1+n}\,n}{\log(\gamma)}+\frac{\gamma^{-1+n}\,(-1+\gamma\log(\gamma))}{\log^2(\gamma)}\right)=\gamma^{-1+n}\,n+\gamma\,n+\gamma^n+1$$

Indefinite integral

$$\int\left(n+\frac{\gamma\,n^2}{2}+\frac{\gamma^{-1+n}\,n}{\log(\gamma)}+\frac{\gamma^{-1+n}\,(-1+\gamma\log(\gamma))}{\log^2(\gamma)}\right)dn=\frac{\gamma\,n^3}{6}+\frac{n^2}{2}+\frac{\gamma^{n-1}\,(\gamma\log(\gamma)-2)}{\log^3(\gamma)}+\frac{\gamma^{n-1}\,n}{\log^2(\gamma)}+\text{constant}$$

Again from the indefinite integral result

$$\int\left(n+\frac{\gamma n^2}{2}+\frac{\gamma^{-1+n} n}{\log(\gamma)}+\frac{\gamma^{-1+n}(-1+\gamma\log(\gamma))}{\log^2(\gamma)}\right)dn=$$
$$\frac{\gamma n^3}{6}+\frac{n^2}{2}+\frac{\gamma^{n-1}(\gamma\log(\gamma)-2)}{\log^3(\gamma)}+\frac{\gamma^{n-1} n}{\log^2(\gamma)}+\text{constant}$$

we obtain:

n^2/2 + (gamma n^3)/6 + (gamma ^(-1 + n) n)/(log^2(gamma)) + (gamma ^(-1 + n) (-2 + gamma log(gamma)))/(log^3(gamma))

Input

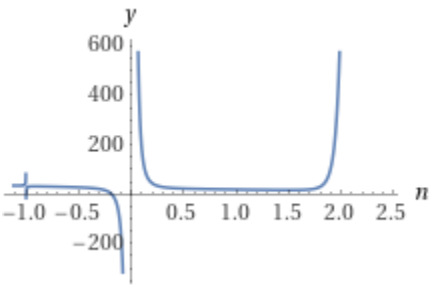
$$\frac{n^2}{2}+\frac{\Gamma(n^3)}{6}+\frac{\gamma^{-1+n} n}{\log^2(\gamma)}+\frac{\gamma^{-1+n}(-2+\gamma\log(\gamma))}{\log^3(\gamma)}$$

$\Gamma(x)$ is the gamma function

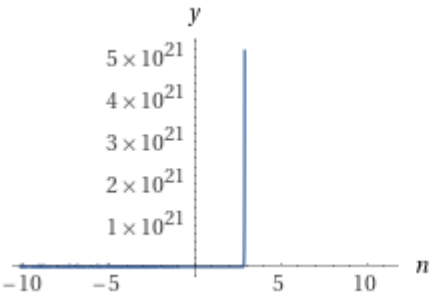
$\log(x)$ is the natural logarithm

γ is the Euler-Mascheroni constant

Plots **(figures that can be related to the open strings)**



(n from −1.1 to 2.5)



(*n* from −10.1 to 11.5)

Alternate forms

$$\frac{1}{6}\left(\Gamma\left(n^3\right)+3\,n^2\right)+\frac{\gamma^{n-1}\left((n+\gamma)\log(\gamma)-2\right)}{\log^3(\gamma)}$$

$$\frac{1}{6}\left(\Gamma\left(n^3\right)+3\,n^2\right)+\frac{\gamma^{n-1}\left(n\log(\gamma)-2+\gamma\log(\gamma)\right)}{\log^3(\gamma)}$$

$$\frac{n^3!}{6\,n^3}+\frac{n^2}{2}+\frac{\gamma^n}{\log^2(\gamma)}+\gamma^{n-1}\left(\frac{n}{\log^2(\gamma)}-\frac{2}{\log^3(\gamma)}\right)$$

$n!$ is the factorial function

Series expansion at n=0

$$\frac{1}{6\,n^3}+\left(-\frac{\gamma}{6}-\frac{2}{\gamma\log^3(\gamma)}+\frac{1}{\log^2(\gamma)}\right)+\frac{n\left(\gamma\log(\gamma)-1\right)}{\gamma\log^2(\gamma)}+O\left(n^2\right)$$

(Laurent series)

Series expansion at n=∞

$$\gamma^{n-1}\left(\frac{n}{\log^2(\gamma)}+O\left(\left(\frac{1}{n}\right)^4\right)\right)+e^{n^3\,(3\log(n)-1)}\left(\frac{1}{3}\sqrt{\frac{\pi}{2}}\left(\frac{1}{n}\right)^{3/2}+O\left(\left(\frac{1}{n}\right)^{7/2}\right)\right)+\left(\frac{n^2}{2}+O\left(\left(\frac{1}{n}\right)^4\right)\right)-\frac{2\,\gamma^{n-1}}{\log^3(\gamma)}+\frac{\gamma^n}{\log^2(\gamma)}$$

Derivative

$$\frac{d}{dn}\left(\frac{n^2}{2}+\frac{\Gamma(n^3)}{6}+\frac{\gamma^{-1+n}\,n}{\log^2(\gamma)}+\frac{\gamma^{-1+n}\,(-2+\gamma\log(\gamma))}{\log^3(\gamma)}\right)=$$
$$\frac{1}{2}n^2\,\Gamma(n^3)\,\psi^{(0)}(n^3)+n+\frac{\gamma^{-1+n}\,(n\log(\gamma)-1)}{\log^2(\gamma)}+\frac{\gamma^n}{\log(\gamma)}$$

$\psi^{(n)}(x)$ is the n^{th} derivative of the digamma function

From the alternate form

$$\frac{n^3!}{6\,n^3}+\frac{n^2}{2}+\frac{\gamma^n}{\log^2(\gamma)}+\gamma^{n-1}\left(\frac{n}{\log^2(\gamma)}-\frac{2}{\log^3(\gamma)}\right)$$

n^2/2 + (n^3 !)/(6 n^3) + gamma ^(-1 + n) (-2/(log^3(gamma)) + n/(log^2(gamma))) + gamma ^n/(log^2(gamma))

for n = 11:

11^2/2 + (11^3 !)/(6 11^3) + γ^(-1 + 11) (-2/(log^3(γ)) + 11/(log^2(γ))) + γ^11/(log^2(γ))

Input

$$\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}$$

$n!$ is the factorial function

$\log(x)$ is the natural logarithm

γ is the Euler-Mascheroni constant

Exact result

$$\frac{847}{3}+\frac{\gamma^{11}}{\log^2(\gamma)}+\gamma^{10}\left(\frac{11}{\log^2(\gamma)}-\frac{2}{\log^3(\gamma)}\right)$$

Decimal approximation

282.540205455908208829935216913878954047946671418362542340571105 55

…

282.5402054559….

Alternate forms

$$\frac{847}{3}+\frac{\gamma^{10}\left((11+\gamma)\log(\gamma)-2\right)}{\log^3(\gamma)}$$

$$\frac{847}{3}-\frac{2\,\gamma^{10}}{\log^3(\gamma)}+\frac{11\,\gamma^{10}+\gamma^{11}}{\log^2(\gamma)}$$

$$\frac{-6\,\gamma^{10}+847\log^3(\gamma)+3\,\gamma^{10}\,(11+\gamma)\log(\gamma)}{3\log^3(\gamma)}$$

Expanded form

$$\frac{847}{3}-\frac{2\,\gamma^{10}}{\log^3(\gamma)}+\frac{11\,\gamma^{10}}{\log^2(\gamma)}+\frac{\gamma^{11}}{\log^2(\gamma)}$$

Alternative representations

$$\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}=$$
$$\frac{11^2}{2}+\frac{11^{2!!\times 3!!}}{6\times 11^3}+\frac{\gamma^{11}}{\log^2(\gamma)}+\gamma^{10}\left(\frac{11}{\log^2(\gamma)}-\frac{2}{\log^3(\gamma)}\right)$$

$$\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}=$$
$$\frac{11^2}{2}+\frac{11^{\Gamma(4)}}{6\times 11^3}+\frac{\gamma^{11}}{(\log(a)\log_a(\gamma))^2}+\gamma^{10}\left(\frac{11}{(\log(a)\log_a(\gamma))^2}-\frac{2}{(\log(a)\log_a(\gamma))^3}\right)$$

$$\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}=$$
$$\frac{11^2}{2}+\frac{11^{(1)_3}}{6\times 11^3}+\frac{\gamma^{11}}{\log_e^2(\gamma)}+\gamma^{10}\left(\frac{11}{\log_e^2(\gamma)}-\frac{2}{\log_e^3(\gamma)}\right)$$

$n!!$ is the double factorial function

$\Gamma(x)$ is the gamma function

$\log_b(x)$ is the base-b logarithm

$(a)_n$ is the Pochhammer symbol (rising factorial)

Series representations

$$\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}=$$
$$\frac{6\gamma^{10}+33\gamma^{10}\sum_{k=1}^{\infty}\frac{(-1)^k(-1+\gamma)^k}{k}+3\gamma^{11}\sum_{k=1}^{\infty}\frac{(-1)^k(-1+\gamma)^k}{k}+847\left(\sum_{k=1}^{\infty}\frac{(-1)^k(-1+\gamma)^k}{k}\right)^3}{3\left(\sum_{k=1}^{\infty}\frac{(-1)^k(-1+\gamma)^k}{k}\right)^3}$$

$$\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}=$$
$$\frac{847}{3}-\frac{2\gamma^{10}}{\left(\log(z_0)+\left\lfloor\frac{\arg(\gamma-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(\gamma-z_0)^k z_0^{-k}}{k}\right)^3}+$$
$$\frac{11\gamma^{10}}{\left(\log(z_0)+\left\lfloor\frac{\arg(\gamma-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(\gamma-z_0)^k z_0^{-k}}{k}\right)^2}+$$
$$\frac{\gamma^{11}}{\left(\log(z_0)+\left\lfloor\frac{\arg(\gamma-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(\gamma-z_0)^k z_0^{-k}}{k}\right)^2}$$

$$\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}=$$
$$\left(-6\gamma^{10}+33\gamma^{10}\sum_{j=1}^{\infty}\text{Res}_{s=-j}\frac{(-1+\gamma)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}+\right.$$
$$3\gamma^{11}\sum_{j=1}^{\infty}\text{Res}_{s=-j}\frac{(-1+\gamma)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}+$$
$$\left.847\left(\sum_{j=1}^{\infty}\text{Res}_{s=-j}\frac{(-1+\gamma)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\right)^3\right)\Big/$$
$$\left(3\left(\sum_{j=1}^{\infty}\text{Res}_{s=-j}\frac{(-1+\gamma)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\right)^3\right)$$

arg(z) is the complex argument

$\lfloor x \rfloor$ is the floor function

Res f is a complex residue $\underset{z=z_0}{}$

Integral representation

$$\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}=\frac{-6\gamma^{10}+33\gamma^{10}\int_1^{\gamma}\frac{1}{t}\,dt+3\gamma^{11}\int_1^{\gamma}\frac{1}{t}\,dt+847\left(\int_1^{\gamma}\frac{1}{t}\,dt\right)^3}{3\left(\int_1^{\gamma}\frac{1}{t}\,dt\right)^3}$$

From which:

6((11^2/2 + (11^3 !)/(6 11^3) + γ^(-1 + 11) (-2/(log^3(γ)) + 11/(log^2(γ))) + γ^11/(log^2(γ))))+34-1/4

Input

$$6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}$$

$n!$ is the factorial function

log(x) is the natural logarithm

γ is the Euler-Mascheroni constant

Exact result

$$\frac{135}{4}+6\left(\frac{847}{3}+\frac{\gamma^{11}}{\log^2(\gamma)}+\gamma^{10}\left(\frac{11}{\log^2(\gamma)}-\frac{2}{\log^3(\gamma)}\right)\right)$$

Decimal approximation

1728.991232735449252979611301483273724287680028510175254043426633 3

…

1728.9912327354….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternate forms

$$\frac{6911}{4}+\frac{6\,\gamma^{10}\,((11+\gamma)\log(\gamma)-2)}{\log^3(\gamma)}$$

$$\frac{6911}{4}-\frac{12\,\gamma^{10}}{\log^3(\gamma)}+\frac{6\left(11\,\gamma^{10}+\gamma^{11}\right)}{\log^2(\gamma)}$$

$$\frac{6911}{4}+\frac{6\,\gamma^{10}\,(11\log(\gamma)-2)}{\log^3(\gamma)}+\frac{6\,\gamma^{11}}{\log^2(\gamma)}$$

Expanded form

$$\frac{6911}{4}-\frac{12\,\gamma^{10}}{\log^3(\gamma)}+\frac{66\,\gamma^{10}}{\log^2(\gamma)}+\frac{6\,\gamma^{11}}{\log^2(\gamma)}$$

Alternative representations

$$6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}=$$
$$34-\frac{1}{4}+6\left(\frac{11^2}{2}+\frac{11^{2!!\times 3!!}}{6\times 11^3}+\frac{\gamma^{11}}{\log^2(\gamma)}+\gamma^{10}\left(\frac{11}{\log^2(\gamma)}-\frac{2}{\log^3(\gamma)}\right)\right)$$

$$6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}=$$
$$34-\frac{1}{4}+6\left(\frac{11^2}{2}+\frac{11^{\Gamma(4)}}{6\times 11^3}+\frac{\gamma^{11}}{(\log(a)\log_a(\gamma))^2}+\gamma^{10}\left(\frac{11}{(\log(a)\log_a(\gamma))^2}-\frac{2}{(\log(a)\log_a(\gamma))^3}\right)\right)$$

$$6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}=$$
$$34-\frac{1}{4}+6\left(\frac{11^2}{2}+\frac{11^{(1)_3}}{6\times 11^3}+\frac{\gamma^{11}}{\log_e^2(\gamma)}+\gamma^{10}\left(\frac{11}{\log_e^2(\gamma)}-\frac{2}{\log_e^3(\gamma)}\right)\right)$$

$n!!$ is the double factorial function

$\Gamma(x)$ is the gamma function

$\log_b(x)$ is the base-b logarithm

$(a)_n$ is the Pochhammer symbol (rising factorial)

Series representations

$$6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}=$$
$$\left(48\,\gamma^{10}+264\,\gamma^{10}\sum_{k=1}^{\infty}\frac{(-1)^k\,(-1+\gamma)^k}{k}+24\,\gamma^{11}\sum_{k=1}^{\infty}\frac{(-1)^k\,(-1+\gamma)^k}{k}+\right.$$
$$\left.6911\left(\sum_{k=1}^{\infty}\frac{(-1)^k\,(-1+\gamma)^k}{k}\right)^3\right)\Big/\left(4\left(\sum_{k=1}^{\infty}\frac{(-1)^k\,(-1+\gamma)^k}{k}\right)^3\right)$$

$$6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}=$$
$$\frac{6911}{4}-\frac{12\,\gamma^{10}}{\left(\log(z_0)+\left\lfloor\frac{\arg(\gamma-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(\gamma-z_0)^k\,z_0^{-k}}{k}\right)^3}+$$
$$\frac{66\,\gamma^{10}}{\left(\log(z_0)+\left\lfloor\frac{\arg(\gamma-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(\gamma-z_0)^k\,z_0^{-k}}{k}\right)^2}+$$
$$\frac{6\,\gamma^{11}}{\left(\log(z_0)+\left\lfloor\frac{\arg(\gamma-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(\gamma-z_0)^k\,z_0^{-k}}{k}\right)^2}$$

$$6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}=$$
$$\left(-48\,\gamma^{10}+264\,\gamma^{10}\sum_{j=1}^{\infty}\text{Res}_{s=-j}\,\frac{(-1+\gamma)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}+\right.$$
$$24\,\gamma^{11}\sum_{j=1}^{\infty}\text{Res}_{s=-j}\,\frac{(-1+\gamma)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}+$$
$$\left.6911\left(\sum_{j=1}^{\infty}\text{Res}_{s=-j}\,\frac{(-1+\gamma)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\right)^3\right)\Big/$$
$$\left(4\left(\sum_{j=1}^{\infty}\text{Res}_{s=-j}\,\frac{(-1+\gamma)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\right)^3\right)$$

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

Res f is a complex residue $_{z=z_0}$

Integral representation

$$6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}=\frac{-48\,\gamma^{10}+264\,\gamma^{10}\int_1^\gamma \frac{1}{t}\,dt+24\,\gamma^{11}\int_1^\gamma \frac{1}{t}\,dt+6911\left(\int_1^\gamma \frac{1}{t}\,dt\right)^3}{4\left(\int_1^\gamma \frac{1}{t}\,dt\right)^3}$$

((6((11^2/2 + (11^3 !)/(6 11^3) + γ^(-1 + 11) (-2/(log^3(γ)) + 11/(log^2(γ))) + γ^11/(log^2(γ))))+34-1/4))^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}}+C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}$$

$n!$ is the factorial function

$\log(x)$ is the natural logarithm

γ is the Euler-Mascheroni constant

C_{MRB} is the MRB constant

Exact result

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\sqrt[15]{\frac{135}{4}+6\left(\frac{847}{3}+\frac{\gamma^{11}}{\log^2(\gamma)}+\gamma^{10}\left(\frac{11}{\log^2(\gamma)}-\frac{2}{\log^3(\gamma)}\right)\right)}$$

Decimal approximation

1.64493746844114955303863687389776223407509511308910223984253956 27

…

1.64493746844…≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\frac{\sqrt[15]{6911+\frac{24\gamma^{10}((11+\gamma)\log(\gamma)-2)}{\log^3(\gamma)}}}{2^{2/15}}$$

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\sqrt[15]{\frac{6911}{4}-\frac{12\gamma^{10}}{\log^3(\gamma)}+\frac{66\gamma^{10}}{\log^2(\gamma)}+\frac{6\gamma^{11}}{\log^2(\gamma)}}$$

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\frac{\sqrt[15]{6911+\frac{24\gamma^{10}(11\log(\gamma)-2)}{\log^3(\gamma)}+\frac{24\gamma^{11}}{\log^2(\gamma)}}}{2^{2/15}}$$

(1/27((6((11^2/2 + (11^3 !)/(6 11^3) + γ^(-1 + 11) (-2/(log^3(γ)) + 11/(log^2(γ))) + γ^11/(log^2(γ))))+34-1/4)-1))^2

Input

$$\left(\frac{1}{27}\left(\left(6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}\right)-1\right)\right)^2$$

$n!$ is the factorial function

$\log(x)$ is the natural logarithm

γ is the Euler-Mascheroni constant

Exact result

$$\frac{1}{729}\left(\frac{131}{4}+6\left(\frac{847}{3}+\frac{\gamma^{11}}{\log^2(\gamma)}+\gamma^{10}\left(\frac{11}{\log^2(\gamma)}-\frac{2}{\log^3(\gamma)}\right)\right)\right)^2$$

Decimal approximation

4095.958436777198279835832662785568564146874724067484427870801404 4

…

4095.958436777…≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternate forms

$$\frac{\left(-48\,\gamma^{10}+6907\log^3(\gamma)+24\,\gamma^{10}\,(11+\gamma)\log(\gamma)\right)^2}{11\,664\log^6(\gamma)}$$

$$\frac{\left(6907\log^3(\gamma)+24\,\gamma^{11}\log(\gamma)+24\,\gamma^{10}\,(11\log(\gamma)-2)\right)^2}{11\,664\log^6(\gamma)}$$

$$\frac{\left(-48\,\gamma^{10}+6907\log^3(\gamma)+264\,\gamma^{10}\log(\gamma)+24\,\gamma^{11}\log(\gamma)\right)^2}{11\,664\log^6(\gamma)}$$

Expanded form

$$\frac{47\,706\,649}{11\,664}+\frac{16\,\gamma^{20}}{81\log^6(\gamma)}-\frac{176\,\gamma^{20}}{81\log^5(\gamma)}-\frac{16\,\gamma^{21}}{81\log^5(\gamma)}+\frac{484\,\gamma^{20}}{81\log^4(\gamma)}+\frac{88\,\gamma^{21}}{81\log^4(\gamma)}+\frac{4\,\gamma^{22}}{81\log^4(\gamma)}-\frac{13\,814\,\gamma^{10}}{243\log^3(\gamma)}+\frac{75\,977\,\gamma^{10}}{243\log^2(\gamma)}+\frac{6907\,\gamma^{11}}{243\log^2(\gamma)}$$

Alternative representations

$$\left(\frac{1}{27}\left(\left(6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}\right)-1\right)\right)^2=\left(\frac{1}{27}\left(33-\frac{1}{4}+6\left(\frac{11^2}{2}+\frac{11^{2!!\times 3!!}}{6\times 11^3}+\frac{\gamma^{11}}{\log^2(\gamma)}+\gamma^{10}\left(\frac{11}{\log^2(\gamma)}-\frac{2}{\log^3(\gamma)}\right)\right)\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}\right)-1\right)\right)^2=\left(\frac{1}{27}\left(33-\frac{1}{4}+6\left(\frac{11^2}{2}+\frac{11^{(1)_3}}{6\times 11^3}+\frac{\gamma^{11}}{\log_e^2(\gamma)}+\gamma^{10}\left(\frac{11}{\log_e^2(\gamma)}-\frac{2}{\log_e^3(\gamma)}\right)\right)\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}\right)-1\right)\right)^2=\left(\frac{1}{27}\left(33-\frac{1}{4}+6\left(\frac{11^2}{2}+\frac{11^{\Gamma(4)}}{6\times 11^3}+\frac{\gamma^{11}}{(\log(a)\log_a(\gamma))^2}+\gamma^{10}\left(\frac{11}{(\log(a)\log_a(\gamma))^2}-\frac{2}{(\log(a)\log_a(\gamma))^3}\right)\right)\right)\right)^2$$

$n!!$ is the double factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\log_b(x)$ is the base-b logarithm

$\Gamma(x)$ is the gamma function

Series representations

$$\left(\frac{1}{27}\left(\left(6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}\right)-1\right)\right)^2=\left(48\gamma^{10}+264\gamma^{10}\sum_{k=1}^{\infty}\frac{(-1)^k(-1+\gamma)^k}{k}+24\gamma^{11}\sum_{k=1}^{\infty}\frac{(-1)^k(-1+\gamma)^k}{k}+6907\left(\sum_{k=1}^{\infty}\frac{(-1)^k(-1+\gamma)^k}{k}\right)^3\right)^2\Big/\left(11\,664\left(\sum_{k=1}^{\infty}\frac{(-1)^k(-1+\gamma)^k}{k}\right)^6\right)$$

$$\left(\frac{1}{27}\left(\left(6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}\right)-1\right)\right)^2=$$

$$\left(-48\,\gamma^{10}+264\,\gamma^{10}\sum_{j=1}^{\infty}\text{Res}_{s=-j}\,\frac{(-1+\gamma)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}+24\,\gamma^{11}\sum_{j=1}^{\infty}\text{Res}_{s=-j}\,\frac{(-1+\gamma)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}+6907\left(\sum_{j=1}^{\infty}\text{Res}_{s=-j}\,\frac{(-1+\gamma)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\right)^3\right)^2\Big/\left(11\,664\left(\sum_{j=1}^{\infty}\text{Res}_{s=-j}\,\frac{(-1+\gamma)^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\right)^6\right)$$

$$\left(\frac{1}{27}\left(\left(6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}\right)-1\right)\right)^2=$$

$$\frac{47706649}{11664}+\frac{16\gamma^{20}}{81\left(2i\pi\left\lfloor\frac{\arg(\gamma-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(\gamma-x)^k x^{-k}}{k}\right)^6}-\frac{176\gamma^{20}}{81\left(2i\pi\left\lfloor\frac{\arg(\gamma-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(\gamma-x)^k x^{-k}}{k}\right)^5}-\frac{16\gamma^{21}}{81\left(2i\pi\left\lfloor\frac{\arg(\gamma-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(\gamma-x)^k x^{-k}}{k}\right)^5}+\frac{484\gamma^{20}}{81\left(2i\pi\left\lfloor\frac{\arg(\gamma-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(\gamma-x)^k x^{-k}}{k}\right)^4}+\frac{88\gamma^{21}}{81\left(2i\pi\left\lfloor\frac{\arg(\gamma-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(\gamma-x)^k x^{-k}}{k}\right)^4}+\frac{4\gamma^{22}}{81\left(2i\pi\left\lfloor\frac{\arg(\gamma-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(\gamma-x)^k x^{-k}}{k}\right)^4}-\frac{13814\gamma^{10}}{243\left(2i\pi\left\lfloor\frac{\arg(\gamma-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(\gamma-x)^k x^{-k}}{k}\right)^3}+\frac{75977\gamma^{10}}{243\left(2i\pi\left\lfloor\frac{\arg(\gamma-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(\gamma-x)^k x^{-k}}{k}\right)^2}+\frac{6907\gamma^{11}}{243\left(2i\pi\left\lfloor\frac{\arg(\gamma-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(\gamma-x)^k x^{-k}}{k}\right)^2}\quad\text{for } x<0$$

$\operatorname{Res}_{z=z_0} f$ is a complex residue

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

Integral representation

$$\left(\frac{1}{27}\left(\left(6\left(\frac{11^2}{2}+\frac{11^{3!}}{6\times 11^3}+\gamma^{-1+11}\left(-\frac{2}{\log^3(\gamma)}+\frac{11}{\log^2(\gamma)}\right)+\frac{\gamma^{11}}{\log^2(\gamma)}\right)+34-\frac{1}{4}\right)-1\right)\right)^2 = \frac{\left(-48\,\gamma^{10}+264\,\gamma^{10}\int_1^\gamma \frac{1}{t}\,dt+24\,\gamma^{11}\int_1^\gamma \frac{1}{t}\,dt+6907\left(\int_1^\gamma \frac{1}{t}\,dt\right)^3\right)^2}{11\,664\left(\int_1^\gamma \frac{1}{t}\,dt\right)^6}$$

For

$1 < a < a', \quad 0 < b < b'$

(a = 3/2; a’ = 2; b = 3; b’ = 4)

and

$$a'^{b'} - a^b = \left(a'^{b'} - a'^{b}\right) + \left(a'^{b} - a^b\right) = a'^{b}\left[a'^{b'-b} - 1\right] + a^b\left[\left(\frac{a'}{a}\right)^b - 1\right]$$

we consider:

((a_1)^b) * [((a_1)^(b_1-b)) – 1] + a^b*[((a_1)/(a))^b-1]

Input

$$a_1^b\left(a_1^{b_1-b}-1\right)+a^b\left(\left(\frac{a_1}{a}\right)^b-1\right)$$

Alternate forms

$$\left(\left(\frac{a_1}{a}\right)^b-1\right)a^b-a_1^b+a_1^{b_1}$$

$$\left(\frac{a_1}{a}\right)^b a^b-a^b+a_1^b\left(a_1^{b_1-b}-1\right)$$

Expanded form

$$\left(\frac{a_1}{a}\right)^b a^b - a^b - a_1^b + a_1^{b_1}$$

Alternate forms assuming a, a_1, b, and b_1 are positive

$$\left(\left(\frac{a}{a_1}\right)^{-b} - 1\right) a^b - a_1^b + a_1^{b_1}$$

$$a_1^{b_1} - a^b$$

Periodicity

periodic in b_1 with period $\frac{2i\pi}{\log(a_1)}$

$\log(x)$ is the natural logarithm

Root for the variable b_1

$$b_1 = \frac{\log\left(a_1^b - a^b\left(\left(\frac{a_1}{a}\right)^b - 1\right)\right)}{\log(a_1)}$$

Derivative

$$\frac{\partial}{\partial a}\left(a_1^b\left(a_1^{b_1-b} - 1\right) + a^b\left(\left(\frac{a_1}{a}\right)^b - 1\right)\right) = b\left(-a^{b-1}\right)$$

Indefinite integral

$$\int\left(a_1^b\left(a_1^{b_1-b} - 1\right) + a^b\left(\left(\frac{a_1}{a}\right)^b - 1\right)\right) da =$$
$$a\left(\left(\left(\frac{a_1}{a}\right)^b - \frac{1}{b+1}\right)a^b - a_1^b + a_1^{b_1}\right) + \text{constant}$$

Limit

$$\lim_{b_1 \to -\infty} \left(a_1^b \left(-1 + a_1^{-b+b_1}\right) + a^b \left(-1 + \left(\frac{a_1}{a}\right)^b\right)\right) = a^b \left(\left(\frac{a_1}{a}\right)^b - 1\right) - a_1^b$$

for $\left(a_1^b, b, a^b \left(\left(\frac{a_1}{a}\right)^b - 1\right)\right) \in \mathbb{R}^3 \wedge \log(a_1) > 0$

$e_1 \wedge e_2 \wedge \ldots$ is the logical AND function

$\mathbb{R}$ is the set of real numbers

From the indefinite integral result

$$\int \left(a_1^b \left(a_1^{b_1 - b} - 1\right) + a^b \left(\left(\frac{a_1}{a}\right)^b - 1\right)\right) da =$$
$$a \left(\left(\left(\frac{a_1}{a}\right)^b - \frac{1}{b+1}\right) a^b - a_1^b + a_1^{b_1}\right) + \text{constant}$$

we obtain:

a (-a_1^b + a_1^(b_1) + a^b ((a_1/a)^b - 1/(1 + b)))

Input

$$a \left(-a_1^b + a_1^{b_1} + a^b \left(\left(\frac{a_1}{a}\right)^b - \frac{1}{1+b}\right)\right)$$

Alternate forms

$$\left(\left(\frac{a_1}{a}\right)^b - \frac{1}{b+1}\right) a^{b+1} + a \left(a_1^{b_1} - a_1^b\right)$$

$$\frac{(b+1)\, a^{b+1} \left(\frac{a_1}{a}\right)^b - a^{b+1} + a\,(b+1) \left(a_1^{b_1} - a_1^b\right)}{b+1}$$

$$-\frac{a \left(-\left(\frac{a_1}{a}\right)^b a^b - b \left(\frac{a_1}{a}\right)^b a^b + a^b + a_1^b - a_1^{b_1} + b\, a_1^b - b\, a_1^{b_1}\right)}{b+1}$$

Expanded form

$$a^{b+1}\left(\frac{a_1}{a}\right)^b - \frac{a^{b+1}}{b+1} - a\,a_1^b + a\,a_1^{b_1}$$

Alternate forms assuming a, a_1, b, and b_1 are positive

$$a\left(\left(\left(\frac{a}{a_1}\right)^{-b} - \frac{1}{b+1}\right)a^b - a_1^b + a_1^{b_1}\right)$$

$$a^{b+1}\left(\left(\frac{a}{a_1}\right)^{-b} - \frac{1}{b+1}\right) - a\,a_1^b + a\,a_1^{b_1}$$

$$a\left(a_1^{b_1} - \frac{a^b}{b+1}\right)$$

Periodicity

periodic in b_1 with period $\frac{2i\pi}{\log(a_1)}$

$\log(x)$ is the natural logarithm

Root for the variable b_1

$$b_1 = \frac{\log\left(-\frac{a^{b+1}\left(\frac{a_1}{a}\right)^b - \frac{a^{b+1}}{b+1} - a\,a_1^b}{a}\right)}{\log(a_1)}$$

Series expansion at a=0

$$\left(\left(a_1^{b_1} - a_1^b\right)a + O\left(a^6\right)\right) + \left(\frac{a_1}{a}\right)^b a^b\left(a + O\left(a^6\right)\right) + a^b\left(-\frac{a}{b+1} + O\left(a^6\right)\right)$$

Series expansion at a=∞

$$\left(\frac{a_1}{a}\right)^b a^b \left(a + O\left(\left(\frac{1}{a}\right)^6\right)\right) + a^b \left(-\frac{a}{b+1} + O\left(\left(\frac{1}{a}\right)^6\right)\right) + \left(\left(a_1^{b_1} - a_1^b\right) a + O\left(\left(\frac{1}{a}\right)^6\right)\right)$$

Derivative

$$\frac{\partial}{\partial a}\left(a\left(-a_1^b + a_1^{b_1} + a^b\left(\left(\frac{a_1}{a}\right)^b - \frac{1}{1+b}\right)\right)\right) = \left(\left(\frac{a_1}{a}\right)^b - 1\right) a^b - a_1^b + a_1^{b_1}$$

Indefinite integral

$$\int a\left(-a_1^b + a_1^{b_1} + a^b\left(\left(\frac{a_1}{a}\right)^b - \frac{1}{1+b}\right)\right) da =$$
$$\frac{1}{2} a^2 \left(\left(\left(\frac{a_1}{a}\right)^b - \frac{2}{b^2+3b+2}\right) a^b - a_1^b + a_1^{b_1}\right) + \text{constant}$$

Limit

$$\lim_{b_1 \to -\infty} a\left(-a_1^b + a_1^{b_1} + a^b\left(\left(\frac{a_1}{a}\right)^b - \frac{1}{1+b}\right)\right) = a\left(a^b\left(\left(\frac{a_1}{a}\right)^b - \frac{1}{b+1}\right) - a_1^b\right)$$
$$\text{for } \left(a, a_1^b, a^b\left(\left(\frac{a_1}{a}\right)^b - \frac{1}{b+1}\right)\right) \in \mathbb{R}^3 \wedge \log(a_1) > 0$$

$e_1 \wedge e_2 \wedge \ldots$ is the logical AND function

$\mathbb{R}$ is the set of real numbers

Again, from the indefinite integral result

$$\int a\left(-a_1^b + a_1^{b_1} + a^b\left(\left(\frac{a_1}{a}\right)^b - \frac{1}{1+b}\right)\right) da =$$
$$\frac{1}{2} a^2 \left(\left(\left(\frac{a_1}{a}\right)^b - \frac{2}{b^2+3b+2}\right) a^b - a_1^b + a_1^{b_1}\right) + \text{constant}$$

we obtain:

1/2 a^2 (-a_1^b + a_1^(b_1) + a^b ((a_1/a)^b - 2/(2 + 3 b + b^2)))

Input

$$\frac{1}{2} a^2 \left(-a_1^b + a_1^{b_1} + a^b\left(\left(\frac{a_1}{a}\right)^b - \frac{2}{2+3b+b^2}\right)\right)$$

Alternate forms

$$\left(\frac{1}{2}\left(\frac{a_1}{a}\right)^b - \frac{1}{b^2+3b+2}\right)a^{b+2} + a^2\left(\frac{a_1^{b_1}}{2} - \frac{a_1^b}{2}\right)$$

$$\frac{\left(b^2+3b+2\right)a^{b+2}\left(\frac{a_1}{a}\right)^b - 2a^{b+2} + a^2\left(b^2+3b+2\right)\left(a_1^{b_1} - a_1^b\right)}{2\left(b^2+3b+2\right)}$$

$$-\frac{1}{2(b+1)(b+2)}a^2\left(-b^2\left(\frac{a_1}{a}\right)^b a^b - 2\left(\frac{a_1}{a}\right)^b a^b - 3b\left(\frac{a_1}{a}\right)^b a^b + 2a^b + b^2 a_1^b - b^2 a_1^{b_1} + 2a_1^b - 2a_1^{b_1} + 3b\,a_1^b - 3b\,a_1^{b_1}\right)$$

Expanded form

$$-\frac{a^{b+2}}{b^2+3b+2} + \frac{1}{2}a^{b+2}\left(\frac{a_1}{a}\right)^b - \frac{1}{2}a^2 a_1^b + \frac{1}{2}a^2 a_1^{b_1}$$

Alternate forms assuming a, a_1, b, and b_1 are positive

$$\frac{1}{2}a^2\left(\left(\left(\frac{a}{a_1}\right)^{-b} - \frac{2}{b^2+3b+2}\right)a^b - a_1^b + a_1^{b_1}\right)$$

$$\frac{1}{2}a^{b+2}\left(\left(\frac{a}{a_1}\right)^{-b} - \frac{2}{b^2+3b+2}\right) - \frac{1}{2}a^2 a_1^b + \frac{1}{2}a^2 a_1^{b_1}$$

$$\frac{1}{2}a^2\left(a_1^{b_1} - \frac{2a^b}{b^2+3b+2}\right)$$

Periodicity

periodic in b_1 with period $\frac{2\,i\,\pi}{\log(a_1)}$

$\log(x)$ is the natural logarithm

Root for the variable b_1

$$b_1 = \frac{\log\left(-\frac{-\frac{2\,a^{b+2}}{b^2+3\,b+2}+a^{b+2}\left(\frac{a_1}{a}\right)^b-a^2\,a_1^b}{a^2}\right)}{\log(a_1)}$$

Series expansion at a=0

$$\left(\frac{1}{2}\left(a_1^{b_1}-a_1^b\right)a^2+O\left(a^6\right)\right)+a^b\left(-\frac{a^2}{b^2+3\,b+2}+O\left(a^6\right)\right)+\left(\frac{a_1}{a}\right)^b a^b\left(\frac{a^2}{2}+O\left(a^6\right)\right)$$

Series expansion at a=∞

$$\left(\frac{1}{2}\left(a_1^{b_1}-a_1^b\right)a^2+O\left(\left(\frac{1}{a}\right)^6\right)\right)+$$
$$a^b\left(-\frac{a^2}{b^2+3\,b+2}+O\left(\left(\frac{1}{a}\right)^6\right)\right)+\left(\frac{a_1}{a}\right)^b a^b\left(\frac{a^2}{2}+O\left(\left(\frac{1}{a}\right)^6\right)\right)$$

Derivative

$$\frac{\partial}{\partial a}\left(\frac{1}{2}\,a^2\left(-a_1^b+a_1^{b_1}+a^b\left(\left(\frac{a_1}{a}\right)^b-\frac{2}{2+3\,b+b^2}\right)\right)\right)=$$
$$a\left(\frac{\left(b\left(\frac{a_1}{a}\right)^b+\left(\frac{a_1}{a}\right)^b-1\right)a^b}{b+1}-a_1^b+a_1^{b_1}\right)$$

Indefinite integral

$$\int \frac{1}{2} a^2 \left(-a_1^b + a_1^{b_1} + a^b \left(\left(\frac{a_1}{a}\right)^b - \frac{2}{2+3b+b^2}\right)\right) da =$$
$$\frac{1}{6} a^3 \left(\left(\left(\frac{a_1}{a}\right)^b - \frac{6}{b^3+6b^2+11b+6}\right) a^b - a_1^b + a_1^{b_1}\right) + \text{constant}$$

Limit

$$\lim_{b_1 \to -\infty} \frac{1}{2} a^2 \left(-a_1^b + a_1^{b_1} + a^b \left(\left(\frac{a_1}{a}\right)^b - \frac{2}{2+3b+b^2}\right)\right) =$$
$$\frac{1}{2} a^2 \left(a^b \left(\left(\frac{a_1}{a}\right)^b - \frac{2}{b^2+3b+2}\right) - a_1^b\right) \approx$$
$$0.5\, a^2 \left(a^b \left(\left(\frac{a_1}{a}\right)^b - \frac{2}{b^2+3b+2}\right) - a_1^b\right) \text{ for}$$
$$\left(a^2, a_1^b, a^b \left(\left(\frac{a_1}{a}\right)^b - \frac{2}{b^2+3b+2}\right)\right) \in \mathbb{R}^3 \wedge \log(a_1) > 0$$

$e_1 \wedge e_2 \wedge \ldots$ is the logical AND function

$\mathbb{R}$ is the set of real numbers

From the indefinite integral result

$$\int \frac{1}{2} a^2 \left(-a_1^b + a_1^{b_1} + a^b \left(\left(\frac{a_1}{a}\right)^b - \frac{2}{2+3b+b^2}\right)\right) da =$$
$$\frac{1}{6} a^3 \left(\left(\left(\frac{a_1}{a}\right)^b - \frac{6}{b^3+6b^2+11b+6}\right) a^b - a_1^b + a_1^{b_1}\right) + \text{constant}$$

1/6 a^3 (-a_1^b + a_1^(b_1) + a^b ((a_1/a)^b - 6/(6 + 11 b + 6 b^2 + b^3)))

for a = 2, a_1 = 4, b = 8, b_1 = 16:

1/6 2^3 (-4^8 + 4^(16) + 2^8 ((4/2)^8 - 6/(6 + 11*8 + 6*8^2 + 8^3)))

Input

$$\frac{1}{6} \times 2^3 \left(-4^8 + 4^{16} + 2^8 \left(\left(\frac{4}{2}\right)^8 - \frac{6}{6+11\times 8+6\times 8^2+8^3}\right)\right)$$

Exact result

$$\frac{2834678414336}{495}$$

Decimal approximation

5.726623059264646464646464646464646464646464646464646464646464646… × 10^9

5.72662305926…*10^9

From which:

((1/6 2^3 (-4^8 + 4^(16) + 2^8 ((4/2)^8 - 6/(6 + 11*8 + 6*8^2 + 8^3)))))^1/3-55-5

Input

$$\sqrt[3]{\frac{1}{6}\times 2^3\left(-4^8+4^{16}+2^8\left(\left(\frac{4}{2}\right)^8-\frac{6}{6+11\times 8+6\times 8^2+8^3}\right)\right)}-55-5$$

Result

$$\frac{8\sqrt[3]{\frac{5536481278}{55}}}{3^{2/3}}-60$$

Decimal approximation

1729.092791564509295248917719640705574355396836118711095469113712 6…

1729.0927915645….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number).

Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternate forms

$$\frac{4}{165}\left(2\times 55^{2/3}\sqrt[3]{16\,609\,443\,834}-2475\right)$$

$$4\left(\frac{2\sqrt[3]{\frac{5\,536\,481\,278}{55}}}{3^{2/3}}-15\right)$$

$$-\frac{4\left(15\times 3^{2/3}-2\sqrt[3]{\frac{5\,536\,481\,278}{55}}\right)}{3^{2/3}}$$

Minimal polynomial

$$495\,x^3+89\,100\,x^2+5\,346\,000\,x-2\,834\,571\,494\,336$$

(((1/6 2^3 (-4^8 + 4^(16) + 2^8 ((4/2)^8 - 6/(6 + 11*8 + 6*8^2 + 8^3)))))^1/3-55-5)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{\sqrt[3]{\frac{1}{6}\times 2^3\left(-4^8+4^{16}+2^8\left(\left(\frac{4}{2}\right)^8-\frac{6}{6+11\times 8+6\times 8^2+8^3}\right)\right)}-55-5}+C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Exact result

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\sqrt[15]{\frac{8\sqrt[3]{\frac{5\,536\,481\,278}{55}}}{3^{2/3}}-60}$$

Decimal approximation

1.644943905308853275328652515756163157817075274285767814341511694 5

…

1.6449439053…≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+2^{2/15}\sqrt[15]{\frac{1}{165}\left(2\times 55^{2/3}\sqrt[3]{16\,609\,443\,834}-2475\right)}$$

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\frac{2^{2/15}\sqrt[15]{2\sqrt[3]{\frac{5\,536\,481\,278}{55}}-15\times 3^{2/3}}}{3^{2/45}}$$

$$\frac{1}{165}C_{\text{MRB}}^{\,-1/(4\pi)}\left(2^{2/15}\times 165^{14/15}\sqrt[15]{2\times 55^{2/3}\sqrt[3]{16\,609\,443\,834}-2475}\sqrt[4\pi]{C_{\text{MRB}}}+165\,C_{\text{MRB}}^{\,1+\pi}\right)$$

(1/27((((1/6 2^3 (-4^8 + 4^(16) + 2^8 ((4/2)^8 - 6/(6 + 11*8 + 6*8^2 + 8^3)))))^1/3-55-5)-1))^2-2/5

Input

$$\left(\frac{1}{27}\left(\left(\sqrt[3]{\frac{1}{6}\times 2^3\left(-4^8+4^{16}+2^8\left(\left(\frac{4}{2}\right)^8-\frac{6}{6+11\times 8+6\times 8^2+8^3}\right)\right)}-55-5\right)-1\right)\right)^2-\frac{2}{5}$$

Result

$$\frac{1}{729}\left(\frac{8\sqrt[3]{\frac{5\,536\,481\,278}{55}}}{3^{2/3}}-61\right)^2-\frac{2}{5}$$

Decimal approximation

4096.039912561342343570591588681693531290639553082174657116253495 5

…

4096.0399125613….

≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge

group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternate forms

$$\frac{93\,365\,415 - 161\,040 \times 55^{2/3} \sqrt[3]{16\,609\,443\,834} + 3520 \sqrt[3]{55}\ 16\,609\,443\,834^{2/3}}{19\,847\,025}$$

$$\frac{1}{729}\left(61 - \frac{8 \sqrt[3]{\frac{5\,536\,481\,278}{55}}}{3^{2/3}}\right)^2 - \frac{2}{5}$$

$$\frac{1}{729}\left(\text{root of } 495\,x^3 + 2\,834\,678\,414\,336 \text{ near } x = -1789.09 + 61\right)^2 - \frac{2}{5}$$

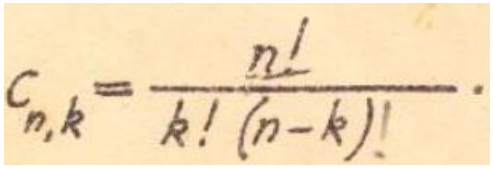
Expanded form

$$\frac{17\,147}{3645} - \frac{976 \sqrt[3]{\frac{5\,536\,481\,278}{55}}}{729 \times 3^{2/3}} + \frac{64 \left(\frac{5\,536\,481\,278}{55}\right)^{2/3}}{2187 \sqrt[3]{3}}$$

Minimal polynomial

$474\,638\,526\,586\,125\,x^3 - 6\,698\,458\,284\,257\,025\,x^2 + 1\,871\,952\,930\,184\,011\,313\,815\,x - 40\,173\,074\,924\,558\,227\,516\,817\,243$

Now, we analyze the following formula:



We consider:

(n!)/(k!(n-k)!)

Input

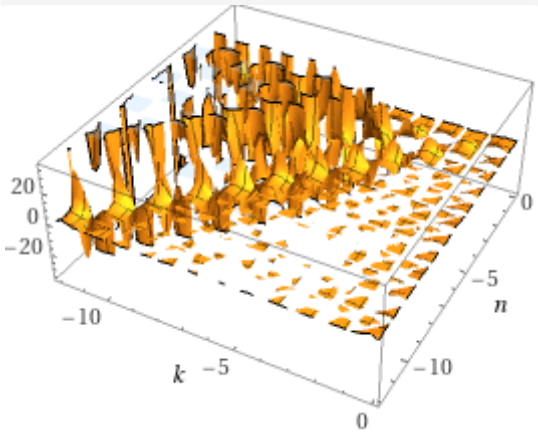
$$\frac{n!}{k!\,(n-k)!}$$

$n!$ is the factorial function

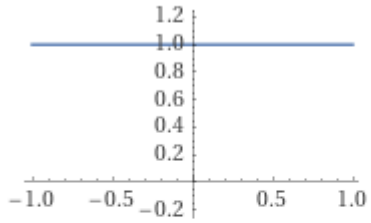
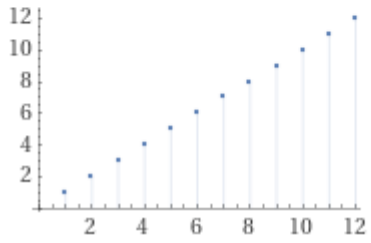
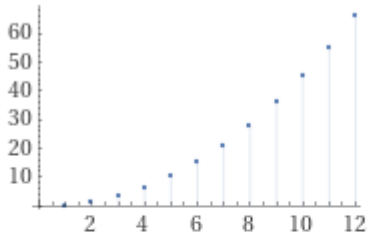
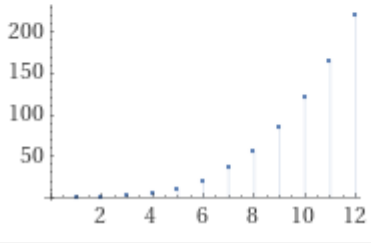
Values

k	
0	1
1	$\frac{n!}{(n-1)!}$
2	$\frac{n!}{2\,(n-2)!}$
3	$\frac{n!}{6\,(n-3)!}$

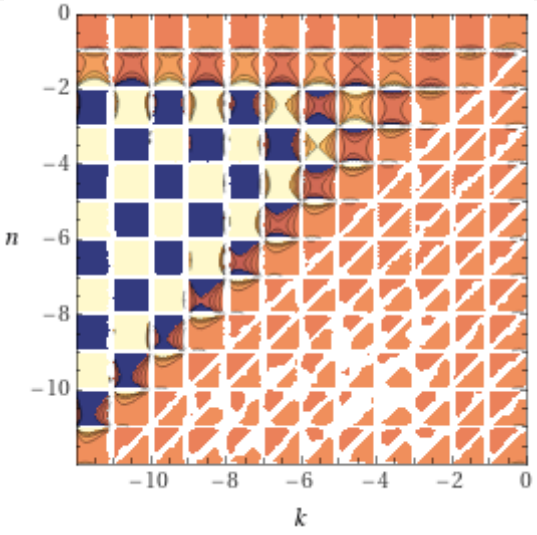
3D plot



Plots

k	
0	 (n from −1 to 1)
1	 (n from 0 to 12)
2	 (n from 0 to 12)
3	 (n from 0 to 12)

Contour plot



Alternate form

$$\frac{\Gamma(n+1)}{\Gamma(k+1)\,\Gamma(-k+n+1)}$$

$\Gamma(x)$ is the gamma function

Roots

(no roots exist)

Series expansion at n=0

$$\frac{1}{k!\,\Gamma(1-k)} - \frac{n\left(\psi^{(0)}(1-k)+\gamma\right)}{k!\,\Gamma(1-k)} + \frac{n^2\left(6\psi^{(0)}(1-k)^2 + 12\gamma\psi^{(0)}(1-k) - 6\psi^{(1)}(1-k) + \pi^2 + 6\gamma^2\right)}{12\,k!\,\Gamma(1-k)} - \frac{1}{12\,(k!\,\Gamma(1-k))} n^3\left(2\psi^{(0)}(1-k)^3 + 6\gamma\psi^{(0)}(1-k)^2 + \left(-6\psi^{(1)}(1-k)+\pi^2+6\gamma^2\right)\psi^{(0)}(1-k) - 6\gamma\psi^{(1)}(1-k) + 2\psi^{(2)}(1-k) + \gamma\pi^2 + 2\gamma^3 - 2\psi^{(2)}(1)\right) + \frac{1}{480\,k!\,\Gamma(1-k)} n^4\left(20\psi^{(0)}(1-k)^4 + 80\gamma\psi^{(0)}(1-k)^3 + 20\left(-6\psi^{(1)}(1-k)+\pi^2+6\gamma^2\right)\psi^{(0)}(1-k)^2 + 40\left(-6\gamma\psi^{(1)}(1-k) + 2\psi^{(2)}(1-k) + \gamma\pi^2 + 2\gamma^3 - 2\psi^{(2)}(1)\right)\psi^{(0)}(1-k) + 60\psi^{(1)}(1-k)^2 - 20\left(6\gamma^2+\pi^2\right)\psi^{(1)}(1-k) + 80\gamma\psi^{(2)}(1-k) - 20\psi^{(3)}(1-k) + 3\pi^4 + 20\gamma^2\pi^2 + 20\gamma^4 - 80\gamma\psi^{(2)}(1)\right) + O\left(n^5\right)$$

(Taylor series)

$\psi^{(n)}(x)$ is the n^{th} derivative of the digamma function

γ is the Euler-Mascheroni constant

Series expansion at n=∞

$$n^k\left(\frac{1}{k!}-\frac{(k-1)\,k}{2\,k!\,n}+\frac{k\left(3\,k^3-10\,k^2+9\,k-2\right)}{24\,k!\,n^2}+O\left(\left(\frac{1}{n}\right)^3\right)\right)$$

Derivative

$$\frac{\partial}{\partial n}\left(\frac{n!}{k!\,(n-k)!}\right)=\frac{\Gamma(n+1)\,\psi^{(0)}(n+1)\,(n-k)!-n!\,\Gamma(-k+n+1)\,\psi^{(0)}(-k+n+1)}{k!\,((n-k)!)^2}$$

From the alternate form

$$\frac{\Gamma(n+1)}{\Gamma(k+1)\,\Gamma(-k+n+1)}$$

Γ(1 + n)/(Γ(1 + k) Γ(1 - k + n))

for n = 4, k = 1:

Γ(1 + 4)/(Γ(1 + 1) Γ(1 - 1 + 4))

Input

$$\frac{\Gamma(1+4)}{\Gamma(1+1)\,\Gamma(1-1+4)}$$

$\Gamma(x)$ is the gamma function

Alternative representations

$$\frac{\Gamma(1+4)}{\Gamma(1+1)\,\Gamma(1-1+4)}=\frac{288}{6\times 12}$$

$$\frac{\Gamma(1+4)}{\Gamma(1+1)\,\Gamma(1-1+4)} = \frac{4!}{1!\times 3!}$$

$$\frac{\Gamma(1+4)}{\Gamma(1+1)\,\Gamma(1-1+4)} = \frac{e^{-\log(12)+\log(288)}}{e^{0}\,e^{-\log(2)+\log(12)}}$$

$n!$ is the factorial function

$\log(x)$ is the natural logarithm

Series representations

$$\frac{\Gamma(1+4)}{\Gamma(1+1)\,\Gamma(1-1+4)} = \frac{\sum_{k=0}^{\infty} \frac{(5-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}{\left(\sum_{k=0}^{\infty} \frac{(2-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}\right)\sum_{k=0}^{\infty} \frac{(4-z_0)^k\,\Gamma^{(k)}(z_0)}{k!}}$$

for ($z_0 \notin \mathbb{Z}$ or $z_0 > 0$)

$$\frac{\Gamma(1+4)}{\Gamma(1+1)\,\Gamma(1-1+4)} = \left(\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty} (2-z_0)^{k_1}\,(4-z_0)^{k_2} \sum_{j_1=0}^{k_1}\sum_{j_2=0}^{k_2}\left((-1)^{j_1+j_2}\,\pi^{-j_1-j_2+k_1+k_2} \sin\left(\frac{1}{2}\pi\,(-j_1+k_1+2\,z_0)\right)\sin\left(\frac{1}{2}\pi\,(-j_2+k_2+2\,z_0)\right)\Gamma^{(j_1)}(1-z_0)\,\Gamma^{(j_2)}(1-z_0)\right)\Big/\left(j_1!\,j_2!\,(-j_1+k_1)!\,(-j_2+k_2)!\right)\right)\Big/ \left(\pi\sum_{k=0}^{\infty}(5-z_0)^k \sum_{j=0}^{k}\frac{(-1)^j\,\pi^{-j+k}\sin\left(\frac{1}{2}\pi\,(-j+k+2\,z_0)\right)\Gamma^{(j)}(1-z_0)}{j!\,(-j+k)!}\right)$$

$\mathbb{Z}$ is the set of integers

Integral representations

$$\frac{\Gamma(1+4)}{\Gamma(1+1)\,\Gamma(1-1+4)} = e^{\int_0^1 \left(x\left(-1+x^3\right)\right)/\log(x)\,dx}$$

$$\frac{\Gamma(1+4)}{\Gamma(1+1)\,\Gamma(1-1+4)} = \exp\left(\gamma + \int_0^1 \frac{1-x^2-x^4+x^5+\log(x^2)+\log(x^4)-\log(x^5)}{(-1+x)\log(x)}\,dx\right)$$

$$\frac{\Gamma(1+4)}{\Gamma(1+1)\,\Gamma(1-1+4)} = \frac{\int_0^1 \log^4\left(\frac{1}{t}\right)dt}{\left(\int_0^1 \log\left(\frac{1}{t}\right)dt\right)\int_0^1 \log^3\left(\frac{1}{t}\right)dt}$$

γ is the Euler-Mascheroni constant

From the alternative representation

$$\frac{\Gamma(1+4)}{\Gamma(1+1)\,\Gamma(1-1+4)} = \frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}}$$

we obtain:

e^(-log(12) + log(288))/(e^0 e^(-log(2) + log(12)))

Input

$$\frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}}$$

$\log(x)$ is the natural logarithm

Result

4

4

Expanded logarithmic form

$$e^{2\log(2)}$$

Alternative representations

$$\frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}} = \frac{e^{\log(288/12)}}{e^{\log(6)}}$$

$$\frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}} = \frac{\exp(-\log(a)\log_a(12)+\log(a)\log_a(288))}{\exp(-\log(a)\log_a(2)+\log(a)\log_a(12))}$$

$$\frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}} = \frac{e^{-\log_e(12)+\log_e(288)}}{e^{-\log_e(2)+\log_e(12)}}$$

$\log_b(x)$ is the base-b logarithm

Series representations

$$\frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}} = \exp\left(2i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor - 4i\pi\left\lfloor\frac{\arg(12-x)}{2\pi}\right\rfloor + 2i\pi\left\lfloor\frac{\arg(288-x)}{2\pi}\right\rfloor + \sum_{k=1}^{\infty}\frac{(-1)^{1+k}\left((2-x)^k - 2(12-x)^k + (288-x)^k\right)x^{-k}}{k}\right) \text{ for } x < 0$$

$$\frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}} = \exp\left(\left\lfloor\frac{\arg(2-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right) - 2\left\lfloor\frac{\arg(12-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right) + \left\lfloor\frac{\arg(288-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right) + \sum_{k=1}^{\infty}\frac{(-1)^{1+k}\left((2-z_0)^k + (288-z_0)^k\right)z_0^{-k}}{k} + 2\sum_{k=1}^{\infty}\frac{(-1)^k(12-z_0)^k z_0^{-k}}{k}\right)$$

$$\frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}} = \exp\left(2\,i\,\pi\left\lfloor -\frac{-\pi+\arg\left(\frac{2}{z_0}\right)+\arg(z_0)}{2\,\pi}\right\rfloor - 4\,i\,\pi\left\lfloor -\frac{-\pi+\arg\left(\frac{12}{z_0}\right)+\arg(z_0)}{2\,\pi}\right\rfloor + 2\,i\,\pi\left\lfloor -\frac{-\pi+\arg\left(\frac{288}{z_0}\right)+\arg(z_0)}{2\,\pi}\right\rfloor + \sum_{k=1}^{\infty}\frac{(-1)^{1+k}\left((2-z_0)^k-2\,(12-z_0)^k+(288-z_0)^k\right)z_0^{-k}}{k}\right)$$

arg(z) is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representations

$$\frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}} = e^{\int_1^{288}\frac{78\,936-2594\,t}{t\,(286+t)\,(276+11\,t)}\,dt}$$

$$\frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}} = \exp\left(\frac{1}{2\,i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{3157^{-s}\,(11^s-2\times 287^s+3157^s)\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right) \text{ for } -1<\gamma<0$$

$\Gamma(x)$ is the gamma function

(e^(-log(12) + log(288))/(e^0 e^(-log(2) + log(12))))^6

Input

$$\left(\frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}}\right)^6$$

log(x) is the natural logarithm

Result

4096

4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Expanded logarithmic form

$e^{2\log(2)\,6}$

27*sqrt((e^(-log(12) + log(288))/(e^0 e^(-log(2) + log(12))))^6)+1

Input

$$27\sqrt{\left(\frac{e^{-\log(12)+\log(288)}}{e^{0}\,e^{-\log(2)+\log(12)}}\right)^{6}}+1$$

$\log(x)$ is the natural logarithm

Result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement

of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Expanded logarithmic form

1729

Alternative representations

$$27\sqrt{\left(\frac{e^{-\log(12)+\log(288)}}{e^{0}\,e^{-\log(2)+\log(12)}}\right)^{6}}+1=1+27\sqrt{\left(\frac{e^{\log(288/12)}}{e^{\log(6)}}\right)^{6}}$$

$$27\sqrt{\left(\frac{e^{-\log(12)+\log(288)}}{e^{0}\,e^{-\log(2)+\log(12)}}\right)^{6}}+1=1+27\sqrt{\left(\frac{e^{-\log_e(12)+\log_e(288)}}{e^{-\log_e(2)+\log_e(12)}}\right)^{6}}$$

$$27\sqrt{\left(\frac{e^{-\log(12)+\log(288)}}{e^{0}\,e^{-\log(2)+\log(12)}}\right)^{6}}+1=$$
$$1+27\sqrt{\left(\frac{\exp(-\log(a)\log_a(12)+\log(a)\log_a(288))}{\exp(-\log(a)\log_a(2)+\log(a)\log_a(12))}\right)^{6}}$$

$\log_b(x)$ is the base-b logarithm

Series representations

$$27\sqrt{\left(\frac{e^{-\log(12)+\log(288)}}{e^{0}\,e^{-\log(2)+\log(12)}}\right)^{6}}+1=$$
$$1+27\sqrt{-1+e^{6(\log(2)-2\log(12)+\log(288))}}\sum_{k=0}^{\infty}\left(-1+e^{6(\log(2)-2\log(12)+\log(288))}\right)^{-k}\binom{\frac{1}{2}}{k}$$

$$27\sqrt{\left(\frac{e^{-\log(12)+\log(288)}}{e^{0}\,e^{-\log(2)+\log(12)}}\right)^{6}}+1=1+27\sqrt{-1+e^{6(\log(2)-2\log(12)+\log(288))}}$$
$$\sum_{k=0}^{\infty}\frac{(-1)^k\left(-1+e^{6(\log(2)-2\log(12)+\log(288))}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$27\sqrt{\left(\frac{e^{-\log(12)+\log(288)}}{e^{0}\,e^{-\log(2)+\log(12)}}\right)^{6}}+1=$$
$$1+27\exp\left(i\pi\left\lfloor\frac{\arg\left(e^{6(\log(2)-2\log(12)+\log(288))}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}$$
$$\sum_{k=0}^{\infty}\frac{(-1)^k\left(e^{6(\log(2)-2\log(12)+\log(288))}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\quad\text{for}\ (x\in\mathbb{R}\ \text{and}\ x<0)$$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$\mathbb{R}$ is the set of real numbers

Integral representations

$$27\sqrt{\left(\frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}}\right)^6}+1=1+27\sqrt{\exp\left(6\int_1^{288}\frac{78\,936-2594\,t}{t\,(286+t)\,(276+11\,t)}\,dt\right)}$$

$$27\sqrt{\left(\frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}}\right)^6}+1=$$

$$1+27\sqrt{\exp\left(\frac{3}{i\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{3157^{-s}\,(11^s-2\times 287^s+3157^s)\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)}$$

for $-1<\gamma<0$

$\Gamma(x)$ is the gamma function

(27*sqrt((e^(-log(12) + log(288))/(e^0 e^(-log(2) + log(12))))^6)+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{27\sqrt{\left(\frac{e^{-\log(12)+\log(288)}}{e^0\, e^{-\log(2)+\log(12)}}\right)^6}+1}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

$\log(x)$ is the natural logarithm

C_{MRB} is the MRB constant

Exact result

$$C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}+\sqrt[15]{1729}$$

Decimal approximation

1.64493802413026025794173319194636695742024244172581638027130567 82

…

1.64493802413…≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate form

$$C_{\text{MRB}}^{-1/(4\pi)}\left(\sqrt[15]{1729}\ \sqrt[4\pi]{C_{\text{MRB}}}+C_{\text{MRB}}^{1+\pi}\right)$$

Expanded logarithmic form

$$\sqrt[15]{1729}+C_{\text{MRB}}^{1-1/(4\pi)+\pi}$$

From

NUOVA TEORIA SISMICA DELLE MAREE - BREVE ESPOSIZIONE DI *GIULIO GRABLOVITZ* – TRIESTE, STABILIMENTO TIPOGRAFICO APPOLONIO & CAPRIN – 1876

Ora passo all' esposizione degli elementi generali della marea pel porto di Venezia basati sulla seguente legge speciale per l' Adriatico:

"La marea adriatica si forma alla latitudine di 38° a 39°, in causa delle oscillazioni impresse al suolo dall' attrazione luni-solare presso all' imbocco del mare Adriatico.„

Questa parte flessibile della crosta terrestre che, secondo tutte le apparenze, ha sede negli arcipelaghi d' indole vulcanica della Sicilia e della Grecia, ha per centro assai probabilmente il monte Etna.

che ha origine dal movimento del suolo. In conseguenza della marea diurna, si genera fra il settentrione del Mare Adriatico e le parti meridionali del Mediterraneo, un' altalena ondosa, che per la sua regolarità non cesserebbe d' un tratto, se anche cessasse l' azione luni-solare; per tal motivo i suoi movimenti non corrispondono alle posizioni astronomiche del giorno in cui avvengono, ma a quelle di 3 giorni prima e l' alta o la bassa marea succede da 2 a 3 ore dopo il passaggio al meridiano; di conseguenza raggiunge il suo massimo dopo il passaggio più vicino allo zenith od al nadir ed il minimo dopo quello più lontano da uno dei detti punti.

Dalle osservazioni del mareografo di Venezia, trovai che il massimo valore di questa marea è di 25 a 30 centimetri allorchè la luna ed il sole hanno una declinazione massima all' epoca delle sizigie (il che avviene dopo i solstizi). Allora la marea risultante è = 0.10 ossia equivale ad un decimo dell' effetto totale, il che s' accorda assai prossimamente con l' altezza razionale delle maree desunta dalle leggi dell' attrazione universale.

The solar eclipse of March 17, 1904 is an astronomical event that took place on the aforementioned day around 5.40 UTC. The annular eclipse was visible in parts of Africa (Tanzania, Mozambique and Asia (Cambodia, Laos, Vietnam, Myanmar).

Tide tables for Venice (April 1904)

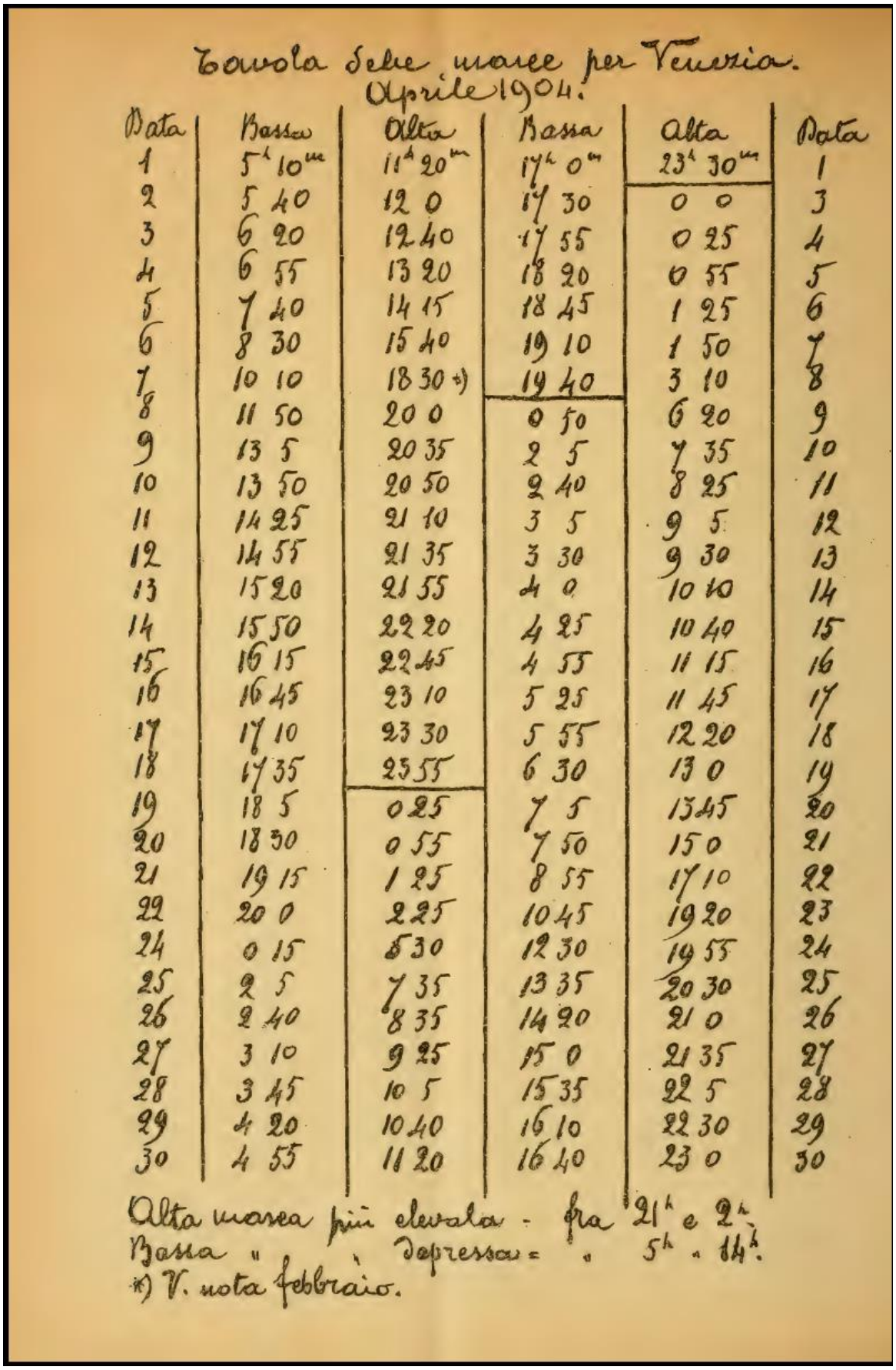


Tavola delle maree per Venezia.
Aprile 1904.

Data	Bassa	Alta	Bassa	Alta	Data
1	5h 10m	11h 20m	17h 0m	23h 30m	1
2	5 40	12 0	17 30	0 0	3
3	6 20	12 40	17 55	0 25	4
4	6 55	13 20	18 20	0 55	5
5	7 40	14 15	18 45	1 25	6
6	8 30	15 40	19 10	1 50	7
7	10 10	18 30 *)	19 40	3 10	8
8	11 50	20 0	0 50	6 20	9
9	13 5	20 35	2 5	7 35	10
10	13 50	20 50	2 40	8 25	11
11	14 25	21 10	3 5	9 5	12
12	14 55	21 35	3 30	9 30	13
13	15 20	21 55	4 0	10 10	14
14	15 50	22 20	4 25	10 40	15
15	16 15	22 45	4 55	11 15	16
16	16 45	23 10	5 25	11 45	17
17	17 10	23 30	5 55	12 20	18
18	17 35	23 55	6 30	13 0	19
19	18 5	0 25	7 5	13 45	20
20	18 30	0 55	7 50	15 0	21
21	19 15	1 25	8 55	17 10	22
22	20 0	2 25	10 45	19 20	23
24	0 15	5 30	12 30	19 55	24
25	2 5	7 35	13 35	20 30	25
26	2 40	8 35	14 20	21 0	26
27	3 10	9 25	15 0	21 35	27
28	3 45	10 5	15 35	22 5	28
29	4 20	10 40	16 10	22 30	29
30	4 55	11 20	16 40	23 0	30

Alta marea più elevata - fra 21h e 2h.
Bassa " depressa = " 5h " 14h.
*) V. nota febbraio.

Tide tables for Venice (May 1904)

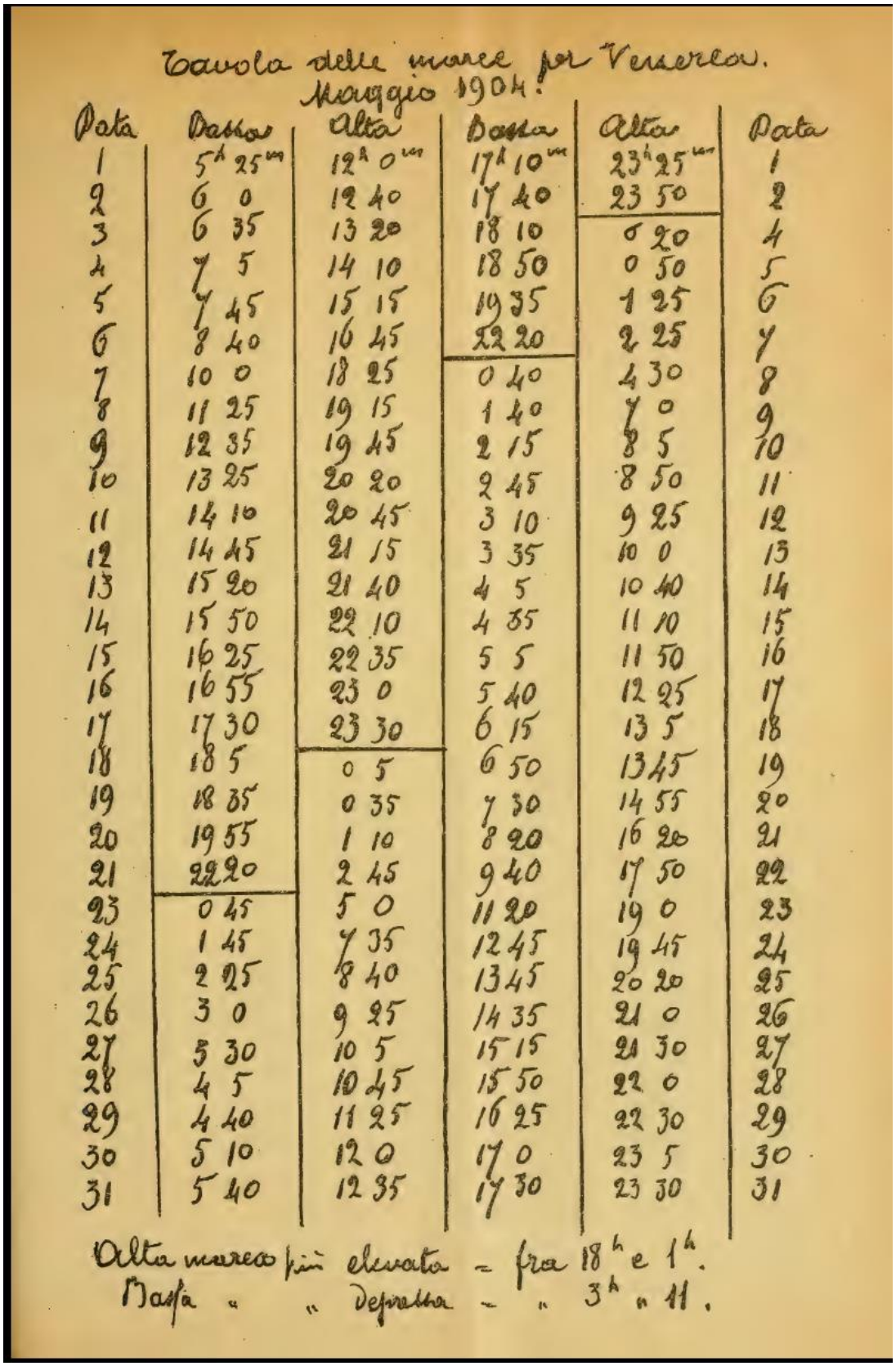


Tavola delle maree per Venezia.
Maggio 1904.

Data	Bassa	Alta	Bassa	Alta	Data
1	5h 25m	12h 0m	17h 10m	23h 25m	1
2	6 0	12 40	17 40	23 50	2
3	6 35	13 20	18 10	0 20	4
4	7 5	14 10	18 50	0 50	5
5	7 45	15 15	19 35	1 25	6
6	8 40	16 45	22 20	2 25	7
7	10 0	18 25	0 40	4 30	8
8	11 25	19 15	1 40	7 0	9
9	12 35	19 45	2 15	8 5	10
10	13 25	20 20	2 45	8 50	11
11	14 10	20 45	3 10	9 25	12
12	14 45	21 15	3 35	10 0	13
13	15 20	21 40	4 5	10 40	14
14	15 50	22 10	4 35	11 10	15
15	16 25	22 35	5 5	11 50	16
16	16 55	23 0	5 40	12 25	17
17	17 30	23 30	6 15	13 5	18
18	18 5	0 5	6 50	13 45	19
19	18 35	0 35	7 30	14 55	20
20	19 55	1 10	8 20	16 20	21
21	22 20	2 45	9 40	17 50	22
23	0 45	5 0	11 20	19 0	23
24	1 45	7 35	12 45	19 45	24
25	2 25	8 40	13 45	20 20	25
26	3 0	9 25	14 35	21 0	26
27	3 30	10 5	15 15	21 30	27
28	4 5	10 45	15 50	22 0	28
29	4 40	11 25	16 25	22 30	29
30	5 10	12 0	17 0	23 5	30
31	5 40	12 35	17 30	23 30	31

Alta marea più elevata = fra 18h e 1h.
Bassa " " depressa = " 3h " 11.

Venice tides

29.04 4:20 Low 10:40 High ; 16:10 Low 22:30 High

(04h 20m)

Input interpretation

4 hours 20 minutes

Results

4.333 hours

260 minutes

Unit conversions

15 600 seconds

15600 seconds = 4.33°

(10h 40m)

Input interpretation

10 hours 40 minutes

Results

10.67 hours

640 minutes

Unit conversions

38 400 seconds

38400 seconds = 10.66°

(16h 10m)

Input interpretation

16 hours 10 minutes

Results

970 minutes

16.17 hours

Unit conversions

58 200 seconds

58200 seconds = 16.16°

(22h 30m)

Input interpretation

22 hours 30 minutes

Results

22.5 hours

1350 minutes

Unit conversions

81 000 seconds

81000 seconds = 22.5°

Now, we perform the following calculations:

Saros cycle

18 years 11 days 8 hours 42 minutes

Thus:

4(18 years 11 days 8 hours 42 minutes)

Input interpretation

4 (18 years 11 days 8 hours 42 minutes)

Results

72 years 45 days 10 hours 48 minutes

72 years 45 days 10 hours 48 minutes

72.12 years

---

26 325 days

---

631 811 hours

3.791×10^7 minutes

We consider:

March 17 1904+72 years 45 days 10 hours 48 minutes (four Saros cycles)

Input interpretation

Thursday, March 17, 1904 + 72 years 45 days 10 hours 48 minutes

Result

10:48 am CET | Saturday, May 1, 1976

01.05.1976

We have that:

The solar eclipse of April 29, 1976 is an astronomical event that took place on the aforementioned day around 10:24 UTC. The annular eclipse was visible in some parts of Europe (Greece), Africa (Algeria, Libya, Mali, Mauritania and Senegal), Asia (Afghanistan, Armenia, Azerbaijan, China, Iran, Kyrgyzstan, Pakistan, Tajikistan and Turkey).

Regarding the lunar phases of late April/early May 1976, we have:

April, 29 1976	**New Moon** 10:19 AM **Solar eclipse**		9°13’

May, 7 1976	**First Quarter Moon**		20°35’

With regard the date April, 29 1976 10h 19m , we obtain:

(10h 19m)

Input interpretation

10 hours 19 minutes

Results

10.32 hours

619 minutes

Unit conversions

37 140 seconds

37140 seconds = 10.316°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.113×10^{10} km (kilometers)

1.113×10^{13} meters

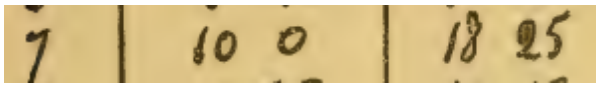
74 au (astronomical units)

6.919 billion miles

Frequency ν from $\nu = 1/T$:

2.7×10^{-5} Hz (hertz)

As for the tides, we have for Venice:



May Low High

Low High May

(2h 25m)

Input interpretation

2 hours 25 minutes

Results

2.417 hours

145 minutes

Unit conversions

8700 seconds

8700 seconds = 2.416°

(10h 00m)

Input interpretation

10 hours

Results

10 hours

600 minutes

Unit conversions

36 000 seconds

36000 seconds = 10°

(18h 25m)

Input interpretation

18 hours 25 minutes

Results

18.42 hours

1105 minutes

Unit conversions

66 300 seconds

66300 seconds = 18.416°

(22h 20m)

Input interpretation

22 hours 20 minutes

Results

1340 minutes

22.33 hours

Unit conversions

80 400 seconds

80400 seconds = 22.33°

1/3((((10° + 18.416° + 22.33°+2.416°)+(4.33° + 10.66° +16.16° + 22.5°)))+(9° 13' + 20° 35'))

Input interpretation

$$\frac{1}{3}\left(\left(\left(10^\circ \text{ (degrees)} + 18.416^\circ \text{ (degrees)} + 22.33^\circ \text{ (degrees)} + 2.416^\circ \text{ (degrees)}\right) + \left(4.33^\circ \text{ (degrees)} + 10.66^\circ \text{ (degrees)} + 16.16^\circ \text{ (degrees)} + 22.5^\circ \text{ (degrees)}\right)\right) + (9 \text{ degrees } 13 \text{ arcminutes} + 20 \text{ degrees } 35 \text{ arcminutes})\right)$$

Results

45 degrees 32.2 arcminutes

45° 32.2’

Input interpretation

45 degrees 32.2 arcminutes

Results

45 degrees 32.2 arcminutes

2732' (arcminutes)

45.54° (degrees)

Unit conversions

45 degrees 32 arcminutes 12 arcseconds

45° 32’

And from:

16.16°

we obtain:

Input interpretation

16.16° (degrees)

Unit conversions

282.05 mrad (milliradians)

0.28205 radians

---

16 degrees 9 arcminutes 36 arcseconds

16° 9’

Thus, we obtain:

45°32'00.0"N 16°09'00.0"E
Cerje Letovanićko, Croazia (distanza da Trieste 266.3 Km)

Southern Tyrrhenian earthquake (Calabria) 6 April 1976, 09:08:58.16

Data	1976-04-06 09:08:58.16
Lat, Lon	38.750, 16.066
depth	110.3 km
Mw	4.90 ± 0.29

(09h 08m)

Input interpretation

9 hours 8 minutes

Results

548 minutes

9.133 hours

Unit conversions

32 880 seconds

32880 seconds = 9.13°

30 Marzo 1976	**NEW MOON alle 17:07**		10°06′
7 Aprile 1976	**First Quarter Moon**		14°16′

(17h 7m)

Input interpretation

17 hours 7 minutes

Results

1027 minutes

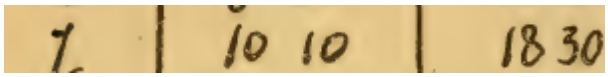
17.12 hours

Unit conversions

61 620 seconds

61620 seconds = 17.116°

Tides April Venice



Low High

Low High

(10h 10m)

Input interpretation

10 hours 10 minutes

Results

10.17 hours

610 minutes

Unit conversions

36 600 seconds

36600 seconds = 10.16°

(18h 30m)

Input interpretation

18 hours 30 minutes

Results

18.5 hours

1110 minutes

Unit conversions

66 600 seconds

66600 seconds = 18.5°

(19h 10m)

Input interpretation

19 hours 10 minutes

Results

1150 minutes

19.17 hours

Unit conversions

69 000 seconds

69000 seconds = 19.16°

(1h 50m)

Input interpretation

1 hour 50 minutes

Results

1.833 hours

110 minutes

Unit conversion

6600 seconds

6600 = 1.83°

From the algebraic sum of the previous results, we obtain:

(10.16° + 18.5° + 19.16° + 1.83° - 10.06°)

Input interpretation

10.16° (degrees) + 18.5° (degrees) +
19.16° (degrees) + 1.83° (degrees) – 10.06° (degrees)

Result

39.59° (degrees)

39.59°

Unit conversions

691 mrad (milliradians)

0.691 radians

---

39 degrees 35 arcminutes 24 arcseconds

39° 35’

Thus, from:

7 Aprile 1976	**First Quarter Moon**		14°16′

we obtain:

39° 35’ N 14° 16’ E

Furthermore, from these other calculations, we obtain:

(10.16° + 18.5° + 19.16° + 1.83° - 9.13°)

Input interpretation

10.16° (degrees) + 18.5° (degrees) +
19.16° (degrees) + 1.83° (degrees) – 9.13° (degrees)

Result

40.52° (degrees)

40.52°

Unit conversions

707.2 mrad (milliradians)

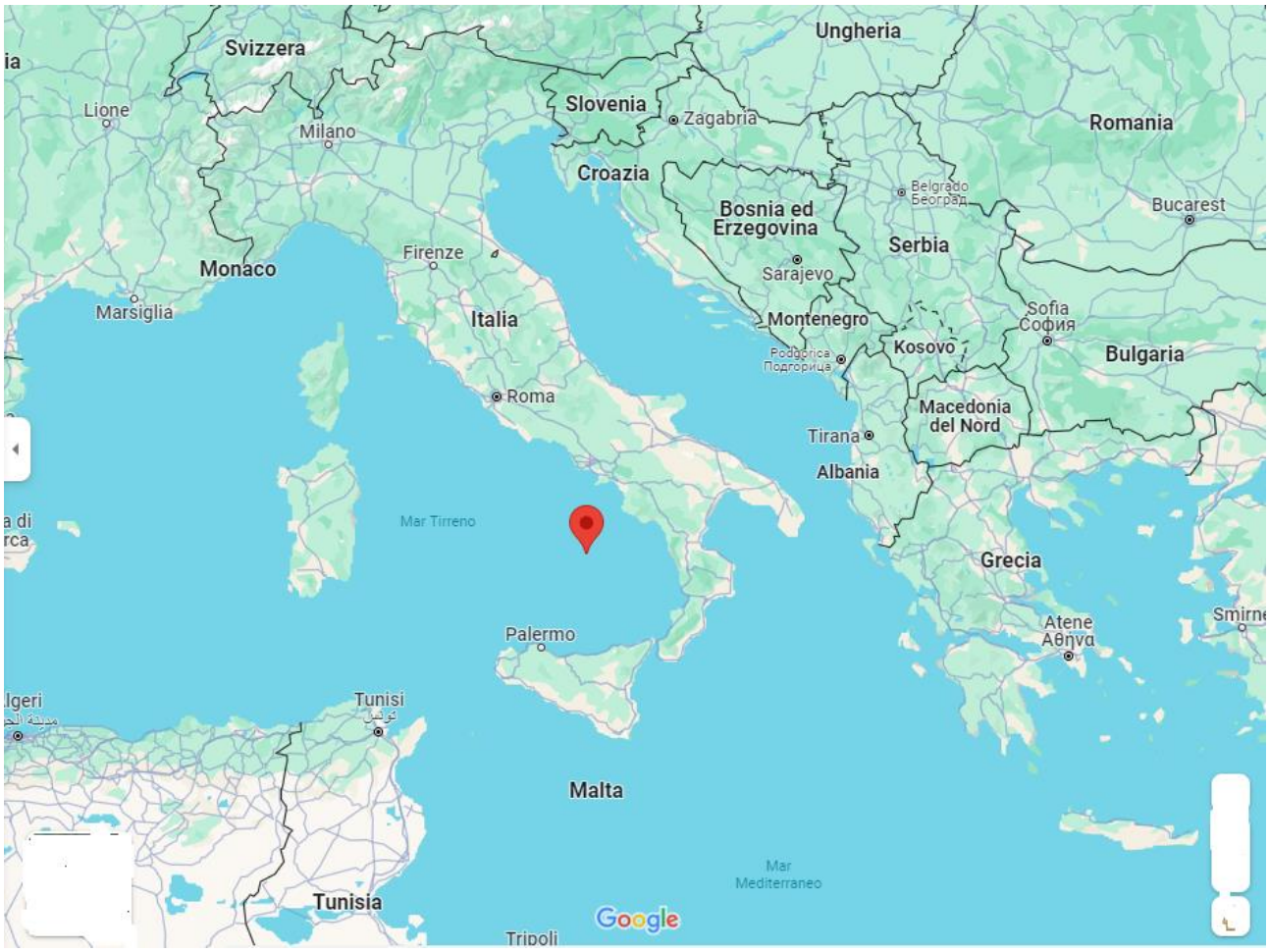
0.7072 radians

---

40 degrees 31 arcminutes

40° 31’ N 14° 16’ E

In the following geographical maps, the locations of the epicentres are visible, corresponding to the geographical coordinates marked there



Tyrrhenian Sea 39° 35’ N 14° 16’ E

Tyrrhenian Sea 40° 31’ N 14° 16’ E

The Friuli earthquake of 6 May 1976 was an earthquake of magnitude 6.5 on the Richter scale which struck Friuli and the surrounding territories at 9.00.12pm on 6 May 1976, with further tremors on 11 and 15 September 46°14 ′27.6″N 13°07′08.4″E

From:

$(45° +((2\sqrt{2})/\pi))$

Input interpretation

$45°$ (degrees) $+ \frac{2\sqrt{2}}{\pi}$

Result

45.9° (degrees)

45.9°

Unit conversions

801.1 mrad (milliradians)

0.8011 radians

---

45 degrees 54 arcminutes 1.139 arcseconds

Input interpretation

$45°$ (degrees) $+ \frac{2\sqrt{2}}{\pi}$

Result

45.9° (degrees)

45.9°

Unit conversions

801.1 mrad (milliradians)

0.8011 radians

---

45 degrees 54 arcminutes 1.139 arcseconds

32.2' + ((2√2)/π)

Input interpretation

$32.2' \text{ (arcminutes)} + \frac{2\sqrt{2}}{\pi}$

Result

33.1' (arcminutes)

33.1’

Unit conversions

0.5517° (degrees)

---

33 arcminutes 6 arcseconds

We obtain:

(45 degrees 54 arcminutes 1.139 arcseconds) + (33 arcminutes 6 arcseconds)

Input interpretation

45 degrees 54 arcminutes 1.139 arcseconds + 33 arcminutes 6 arcseconds

Results

46 degrees 27 arcminutes 7.139 arcseconds

46° 27’

2787' (arcminutes)

46.45° (degrees)

Unit conversions

3^{h} 5^{m} 48.48^{s} (right ascension)

810.7 mrad (milliradians)

0.8107 radians

51.61 grads
(unit officially deprecated)

Interpretation

plane angle

Basic unit dimensions

[angle]

Corresponding quantities

Rotation count N from $N = \varphi/(2\pi)$:

0.13 rot (rotations)

Slope percentage from [slope percentage] $= 100\% \times \tan(\theta)$:

105 slope% (slope percent)

14° 16’

(14° +((2√2)/π))

Input interpretation

$14°$ (degrees) $+ \frac{2\sqrt{2}}{\pi}$

Result

14.9° (degrees)

14.9°

Unit conversions

260.1 mrad (milliradians)

0.2601 radians

14 degrees 54 arcminutes 1.139 arcseconds

14° 54’

16' + ((2√2)/π)

Input interpretation

$16'$ (arcminutes) $+ \frac{2\sqrt{2}}{\pi}$

Result

16.9' (arcminutes)

16.9’

Unit conversions

0.2817° (degrees)

---

16 arcminutes 54.02 arcseconds

16’ 54.02’’

In conclusion, we obtain:

(14 degrees 54 arcminutes 1.139 arcseconds) + (16 arcminutes 54.02 arcseconds)

Input interpretation

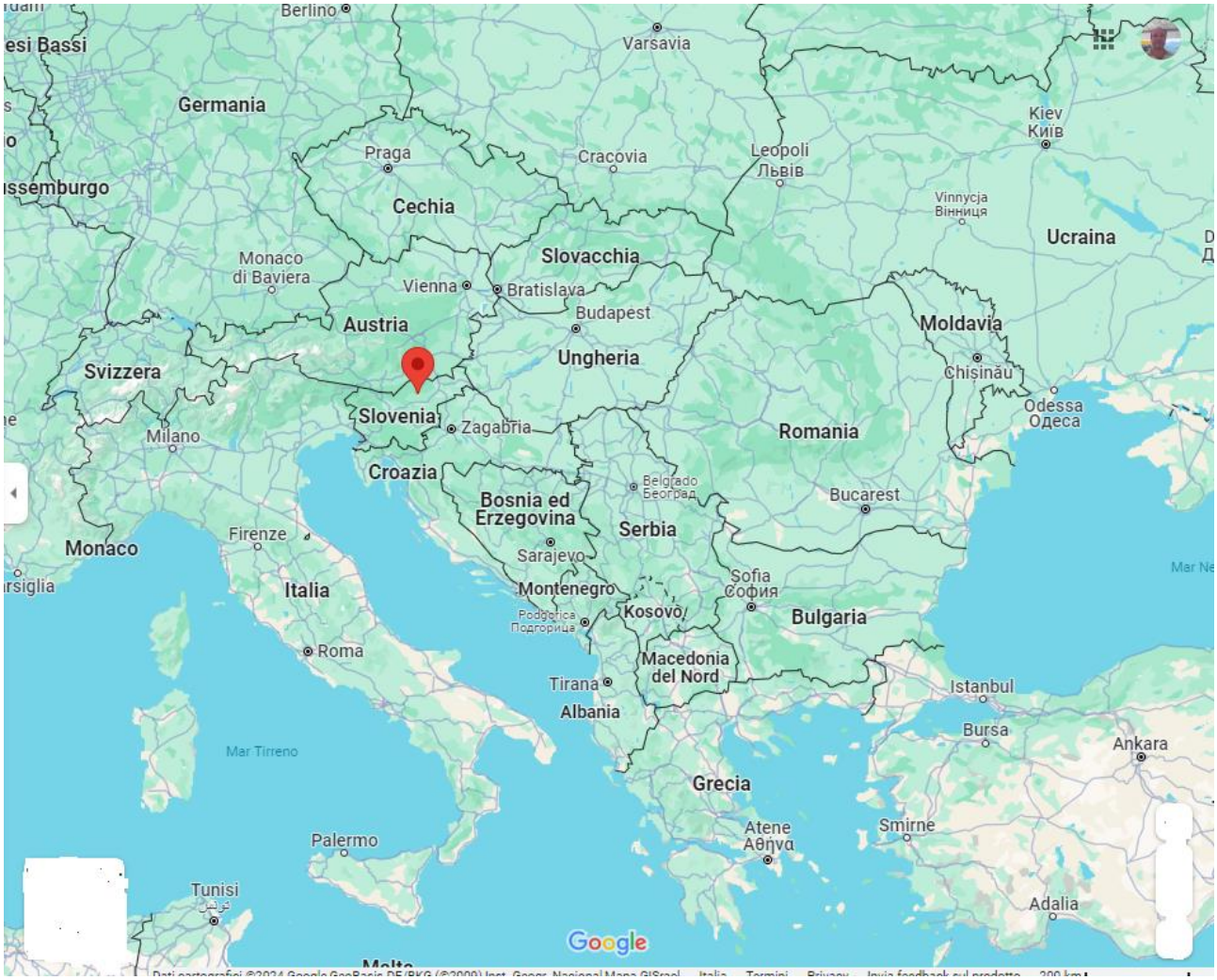
14 degrees 54 arcminutes 1.139 arcseconds + 16 arcminutes 54.02 arcseconds

Results

15 degrees 10 arcminutes 55.16 arcseconds

15° 10’

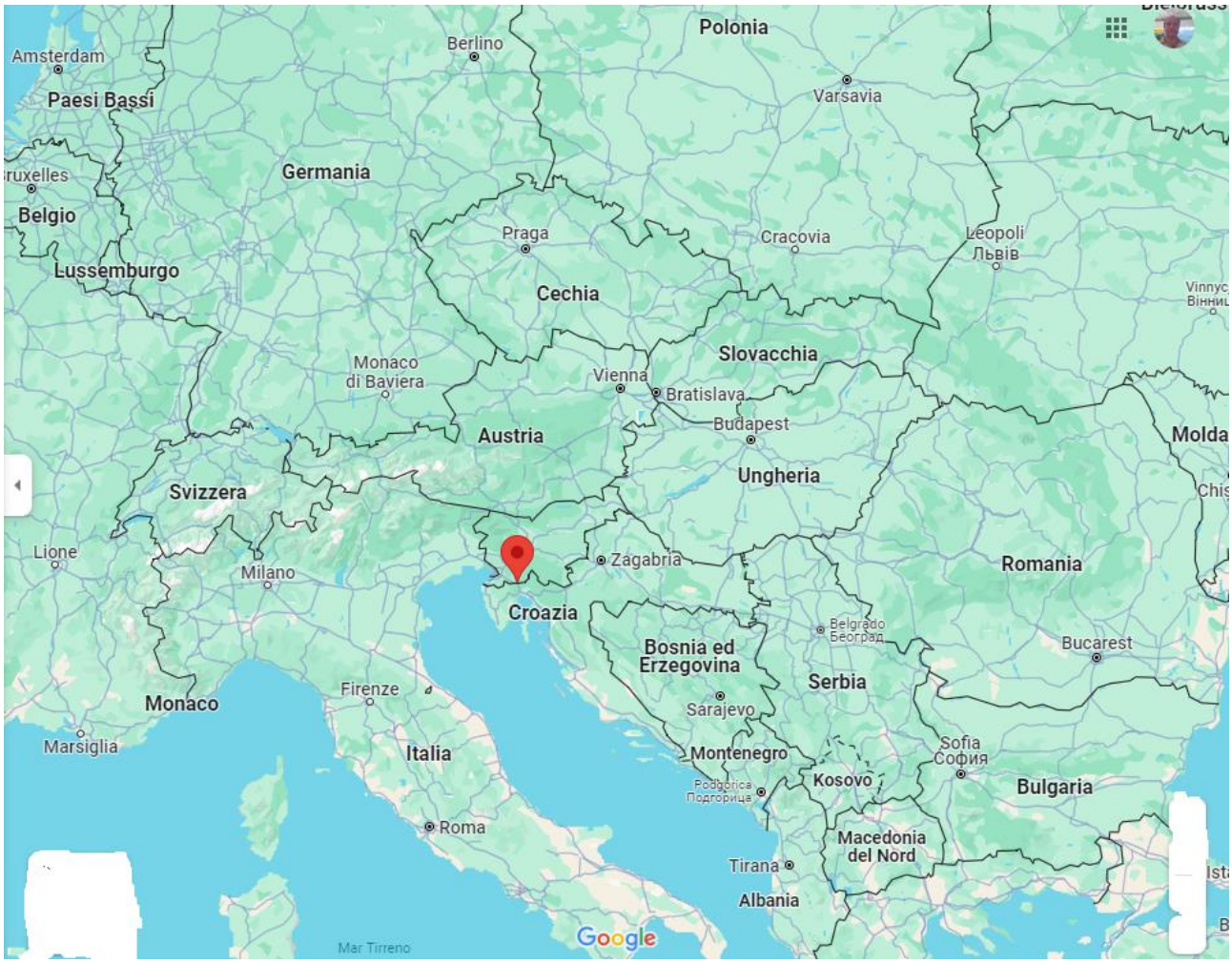
46° 27’ N 15° 10’ E Mislinja, Slovenia (232,9 km) distanza dal Friuli-Venezia Giulia



45° 32.2’ N 14° 16’ E 153.7 Km distanza

45°32'00.0"N 14°16'00.0"E

From Gornji Zemon, 6250, Slovenia to Friuli-Venezia Giulia 1 ora 54 min (153,7 km)



Or also:

(14° -((2√2)/π))

Input interpretation

$14°$ (degrees) $- \frac{2\sqrt{2}}{\pi}$

Result

13.1° (degrees)

13.1°

Unit conversions

228.6 mrad (milliradians)

0.2286 radians

---

13 degrees 5 arcminutes 58.86 arcseconds

16' - ((2√2)/π)

Input interpretation

$16'$ (arcminutes) $- \frac{2\sqrt{2}}{\pi}$

Result

15.1' (arcminutes)

15.1’

Unit conversions

0.2517° (degrees)

---

15 arcminutes 5.981 arcseconds

In conclusion, we obtain:

(13 degrees 5 arcminutes 58.86 arcseconds)+(15 arcminutes 5.981 arcseconds)

Input interpretation

13 degrees 5 arcminutes 58.86 arcseconds + 15 arcminutes 5.981 arcseconds

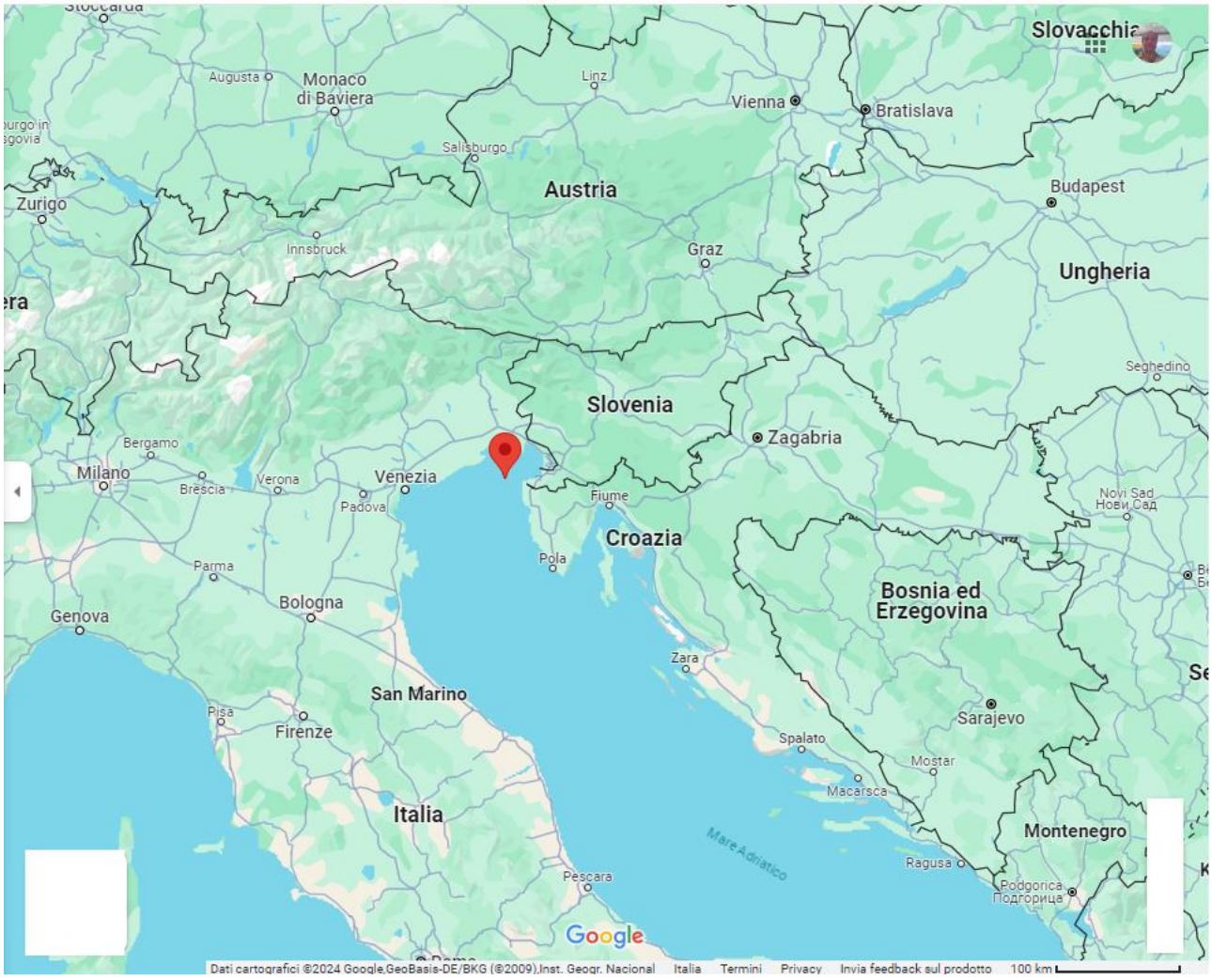
Results

13 degrees 21 arcminutes 4.841 arcseconds

13° 21’

Thus, from the previous calculations:

45°32'00.0"N 13°21'00.0"E Mar Mediterraneo /MareAdriatico)



Observations and conclusions

Electromagnetic phenomena accompany periods of earthquakes, and which at that time often take the place of telluric motions. In addition to this, they predominate every year during one or two months which chooses between March and May or, at the latest, enters June and July. **The activity of the sun is the center of electromagnetic phenomena** (Michele Stefano De Rossi – "Meteorologia Endogena")

Recall that tidal force (generally used in the plural, tidal forces or tidal forces, and also with the expression tidal effects) is a secondary effect of the **force of gravity**. Tidal effects from different bodies can add up, as in the case of the alignment between the Moon and the Sun which gives rise to intense syzygial tides.

The undoubted correlation that Prof. De Rossi felt between the Corleone earthquakes and those of Monte Baldo last year moved me to pay special attention to the latter as well. Rummaging through the scientific yearbooks, I found the precise dates of the strongest earthquakes felt in 1866 on the slopes of Monte Baldo, namely: 13 June, 11 August and 7-8 November, which correspond to the new moons; in 1870 seismic activity reawakened there, but I don't know the dates; in 1876 the first strong shock occurred on April 23, that is, on the eve of the new moon; with the perigee (which took place on the 26th) the shocks prepared by the new moon continued until the 29th; then the frequency decreased until May 4th and it already seemed to have left those populations in peace; except that the next coincidence of the new moon with the perigee and with a strong northern declination (in which position, as I already said, one of the two passages to the meridian is an energetic occasion for an earthquake) provided me with such a clue of awakening, probably on a greater extent of land , that here I prepared myself for careful surveillance, so as not to miss the most important phases of the phenomenon, when this happened. I mentioned this probability to Prof. Don Timoteo Bertelli of Florence in my letter of May 1st and to Prof. Goiran of Verona in a letter of the same 12th. The critical day otherwise passed peacefully in Trieste; not so in Monte Baldo, where the tremors resumed on the 22nd and continued on the 23rd, to be repeated on the 29th; at the same time in Corleone the activity, which had seemed almost extinguished since the 10th, was reawakened with a shock on the 20th, one on the 21st, four on the 24th and with great energy on the 25th. On May 22nd, the eve of the new moon, the very strong earthquake also occurred of Spoleto and at the time of the new moon in question there was, it can be said, no region of the Apennines in which seismic activity did not manifest itself with greater or lesser force, as can be seen from the bulletin.

In Monte Baldo there was a truce during June; in July the tremors resumed the day after the full moon and continued thereafter without interruption; in the following months tremors were noted on August 7th, September 5th, October 9th and November 4th, that is, almost always one or two days after the full moon. It is remarkable that on May 22nd and 23rd, while the rest of Italy was shaking, there was a truce in Corleone and then an immediate awakening, and the truce that occurred in the new moons following Monte Baldo in the face of energy is equally significant. manifested itself at the same time as Corleone, where the endogenous forces were transported by geological-mechanical effects, which it is not my task to erudite. In 1870, as far as I can remember, the seismic period of Monte Baldo put an end to that of Monte Nevoso (Julian Alps). This began on February 28th with a strong tremor at 12.20 pm; the next day the shocks were repeated and so also on the day of the new moon, March 2, and the following; after a fifteen-day truce a shock was felt at the full moon; then there were other tremors, the dates of which I could not know; those that came to my attention, and were the strongest, occurred on April 28th (the eve of the new moon), on May 10th, on May 15th (full moon), on June 2nd (near the new moon) and several between the 13th and the 19th. June (full moon period). Then the activity died down there and arose in Monte Baldo. Monte Nevoso was frequently subject to earthquakes; in relatively recent times there was a long period from November 1750 to May 1753; and in 1838 the populations remained in suspense for three months. That local area includes the city of Rijeka; and even in the small earthquakes, which occur here from time to time, I have observed a decided prevalence of syzygies. From this we see that some seismic periods, although limited within very narrow boundaries, can be the effect of a large telluric cause. I took the Corleone period into special consideration, because this is one of the few whose phases have been carefully studied and from which there is a sufficiently large number of shocks to draw positive consequences. There was another seismic period of recent memory and well studied, that of Belluno; the existing relationship between it and the lunar positions has no need of my demonstrations, because the illustrious Falb proved it since he predicted, based on his theories, the return of the phenomenon even during the course of the period itself.

Perhaps all the seismic phenomena that occur in Italy have as their cause, if not direct, at least determining, the action of the stars, but while on the one hand the lack of sufficient observations does not allow very extensive studies, on the other hand the translocation, which often happens, seismic centers distract the attention of investigators so as not to allow them to glimpse the effects of a great common cause in isolated phenomena.

It is desirable that the invitation made repeatedly by Prof. Cav. De Rossi, in order to obtain the greatest possible number of reports on seismic phenomena, must be listened to by those who have the progress of science at heart and that no one abstains from communicating even crude observations of such phenomena, the memory of which without this could be lost to the detriment of science. (**DELL' ATTRAZIONE LUNI- SOLARE IN RELAZIONE COI FENOMENI MAREO – SISMICI** - STUDI DIMOSTRATIVI DI GIULIO GRABLOVITZ – 1877)

In conclusion:

While **the activity of the sun is the center of electromagnetic phenomena,** the tidal force, hence the luni-solar attraction, is a secondary effect of the **force of gravity**. The **aurora borealis**, for example, is a phenomenon visually characterized by luminous bands that take on a wide range of shapes and colours, rapidly changing in time and space, usually red-green-blue in colour, called auroral arcs, caused from the interaction of charged particles (protons and electrons) of solar origin (solar wind) with the terrestrial ionosphere (atmosphere between 100-500 km): these particles excite the atoms of the atmosphere which, subsequently de-energizing, emit light of various lengths 'wave. Solar activity is a source of emission of **electromagnetic waves** and **electrically charged particles**, the luni-solar attraction, is a secondary effect of the **force of gravity**. It is therefore possible to hypothesize a connection, albeit indirect, between these phenomena and "**gravitational waves**" which, among other things, travel at a speed equal to c (speed of light), as well as **electromagnetic waves**. Thus, there is a purely mathematical connection between seismic waves and gravitational waves.

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

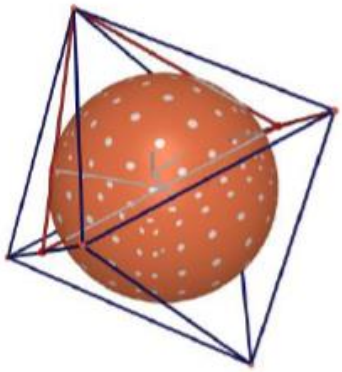


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$$\frac{\sqrt{2}\ 2}{\pi} \quad (\text{for } l \neq 0)$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\ l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.141939571526584308924330732196162632677513386811659044682541739 3

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$
$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

$4096 = 64^2$, (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$). The number 1728 is one less than the Hardy–Ramanujan

number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.61805\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+\right.$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}\right)$$

for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$$\frac{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+\right.$$
$$27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^{\,8}\right)}{2\pi}\right\rfloor\right)\sqrt{x}$$
$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^{\,8}\right)^k}{k!}\right) \text{ for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$

$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^{\,8}-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^{\,8}-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi\, e^0 \approx 3.1416$ (real, principal root)

$\pi\, e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1 \sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003 \quad \text{(real, principal root)}$$

$$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003 \quad \text{(real root)}$$

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\pi \left\lfloor \frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k \left(\frac{8}{\pi^2}-x\right)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=$$

$$\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\ a^3\right)\left(\sqrt{2}\ d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\frac{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}{3\times3}}}} =$$

$$\sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\ z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\right.\right.\right.$$

$$\left.\left.\left. z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\ z_0^{-k}}{k!}\right)\right)\Big/$$

$$\left.\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\ z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.1415926535884871624221932509858715278931025189245576170078100613
…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\left(\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

---

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2 \times \frac{2 \cdot \sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi \cdot 0.9991104684}(C \times \mathrm{R} \times 2.33 \cdot 10^{-13})}} \cong 1.61803398\ldots = \frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1} = 1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}} \approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.6180359123482642354401744088347098542545273508401733563064818107
…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\,x^2\,y\,z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\,dx\,dy\,dz = 12.9443\,L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\,dz\,dy\,dx = 6.77761\,R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$ is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

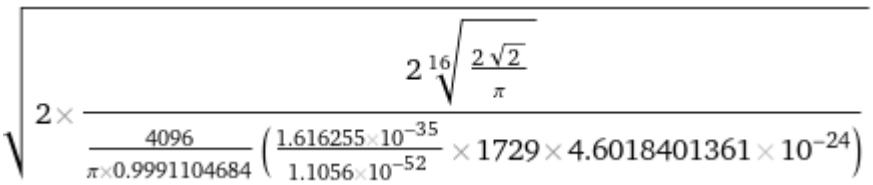
From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...



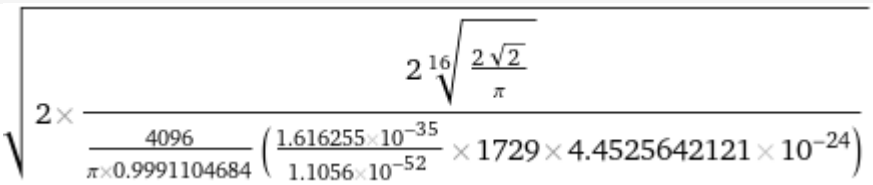
1.6180329973075324915067570166297467464225772608929671407919395903
…

1.6180329973075… result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation



Result

1.6449323521020921304838989837041511688766218416551668779141660338
…

1.64493235210209213…≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

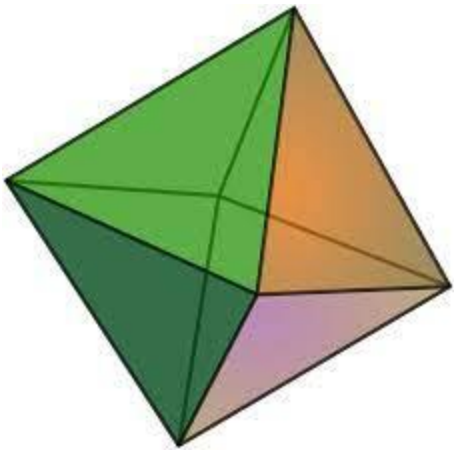
Result

3.14159225731469939939950039231605796469731171781644423955790024797

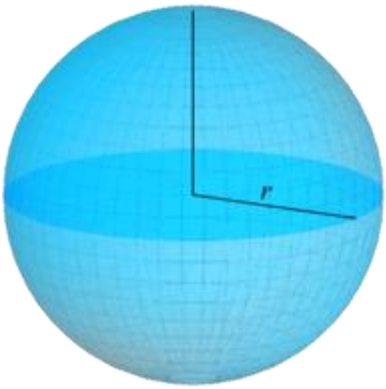
…

3.14159225731469…≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find *a*, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

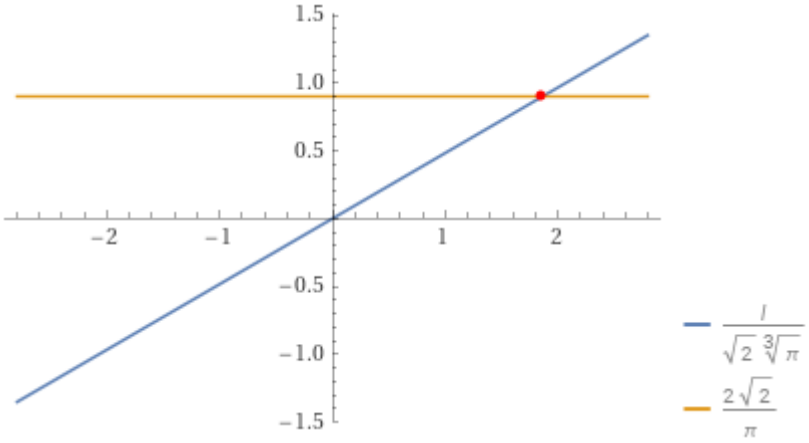
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor \arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256x^8 + 95\,744x^7 - 3\,248\,750\,080x^6 - 914\,210\,725\,504x^5 + 15\,498\,355\,554\,921\,184x^4 + 2\,911\,478\,392\,539\,914\,656x^3 - 32\,941\,144\,911\,224\,677\,091\,680x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not}\ (z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

1.64381856858…. $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\text{^}\,(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\wedge(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\wedge(1/15)\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)}\quad\text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

$1.6272016\ldots * 10^{-6}$

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

−5.010882647757...

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $b=-\frac{226\,802\,245}{18\,480\,874}$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

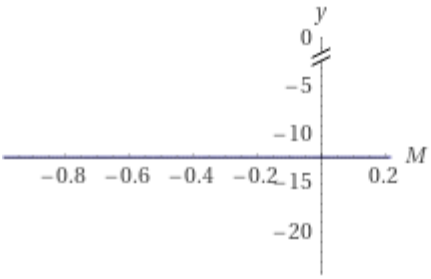
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

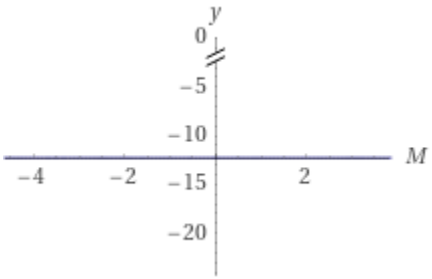
Result:

$$\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}\ -12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}\ -0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int \frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM = \frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\} = -\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\} = -\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2} = -12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V=\frac{1}{3}\left(0.0814845\,b+1\right)^2M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

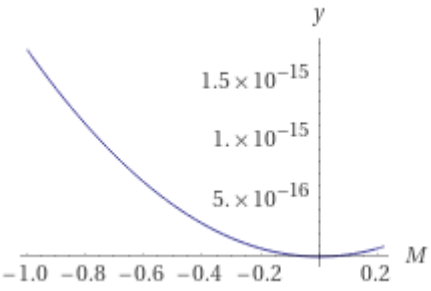
Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

Result:

0

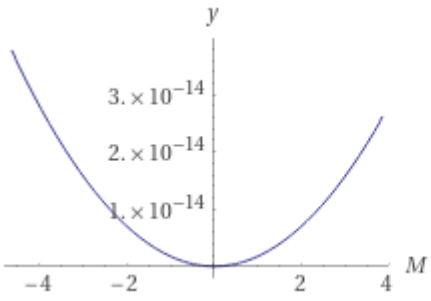
Plots: **(possible mathematical connection with an open string)**



(*M* from −1 to 0.2)

M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$$O\left(M^{62\,194}\right)$$

(Taylor series)

Series expansion at M = ∞:

$$1.75541\times10^{-15}\,M^2+O\left(\left(\frac{1}{M}\right)^{62\,194}\right)$$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{1}{3}\,M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2\left(-0.5^2\right)$$

Result:

$$-4.3885134494746454534897078337808802083333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^-16

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-17}$

$7.021621519159*10^{-17}$

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

$1.57986484181*10^{-14}$

For M = 2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times 2^2+6.58545\times 10^{-10}\sqrt{2^4}\right)}{2^2}+1\right)^2\times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times 10^{-15}$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots \times 10^{-8}$

$5.9776991059*10^{-8}$ result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^{2} = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left(\left(1/\left(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}\right)\right)\text{ ^ }(1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

5.729475 * 10^{-35} Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

1.820306 * 10^{61} V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

5.975498*10^{-8} V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

1.042940*10^{27} V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

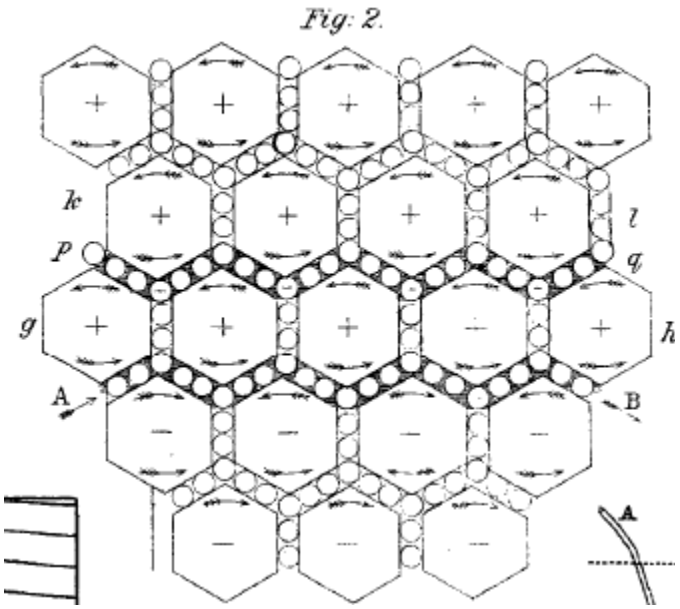
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

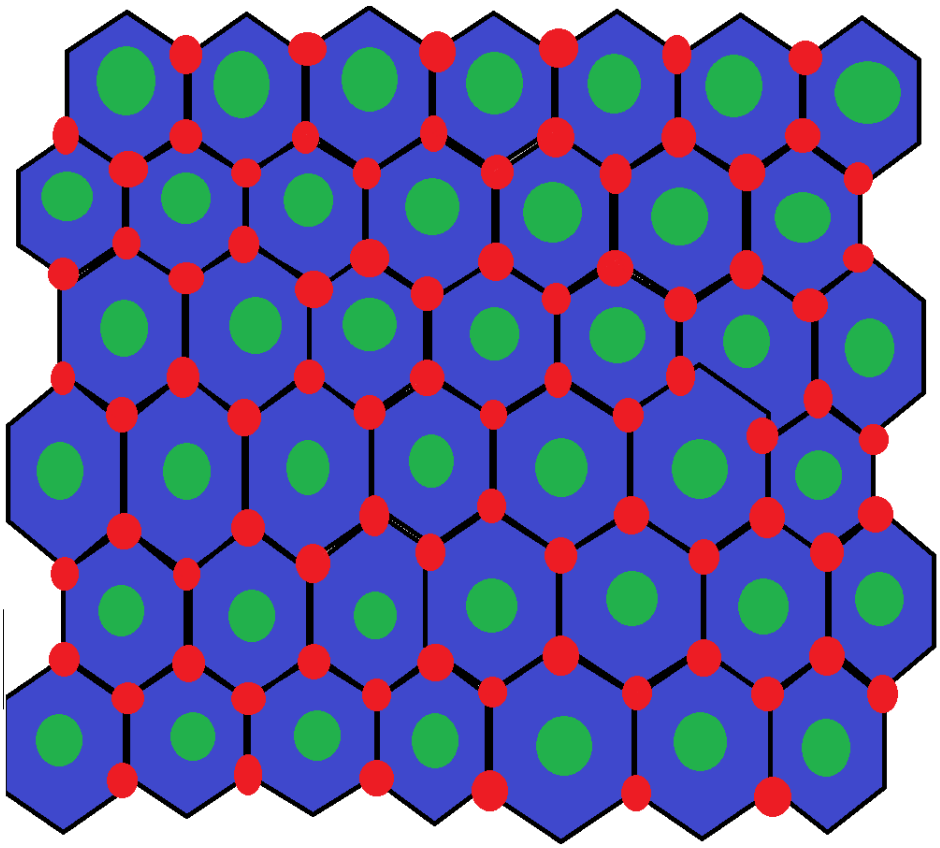
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On some equations concerning the seismology and the calculation relating to the tides and solar eclipses. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory VIII

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper (part VIII), we analyze some equations concerning the seismology and the calculation relating to the tides and solar eclipses. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory

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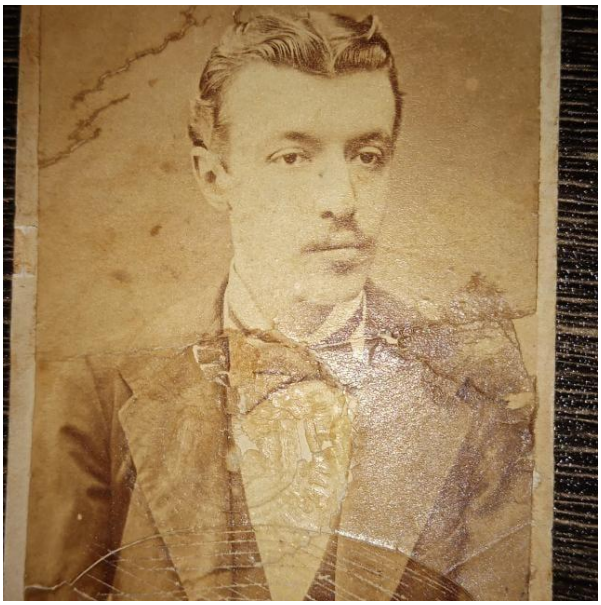
A. Nardelli studied at the Università degli Studi di Napoli Federico II - Dipartimento di Studi Umanistici – **Sezione Filosofia - scholar of Theoretical Philosophy**

Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

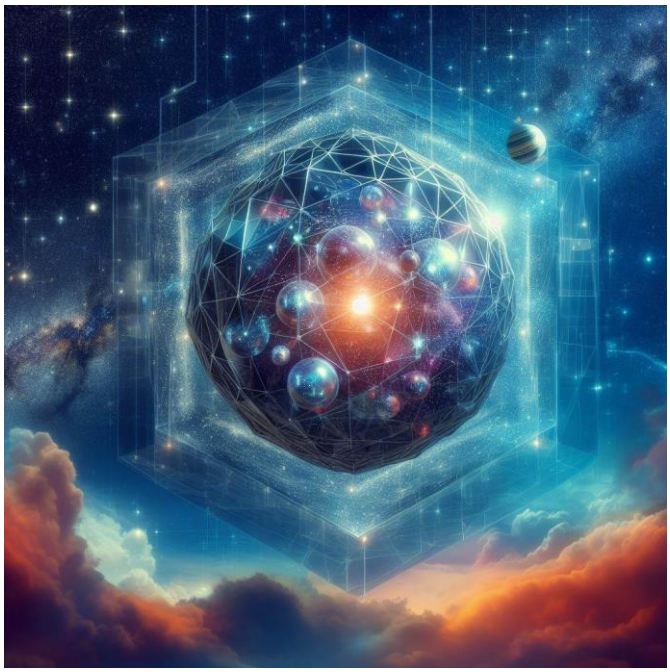
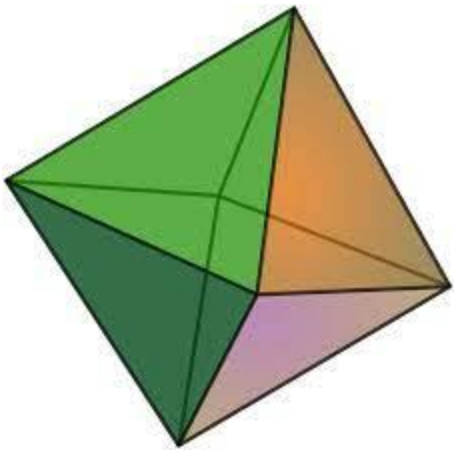
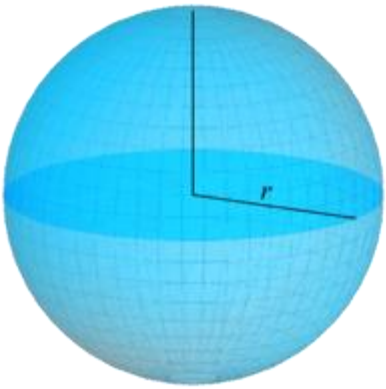


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\pi x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$l = 0, \quad x = 0$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt{2}\ \sqrt[3]{\pi}\right) = \log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\ \pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

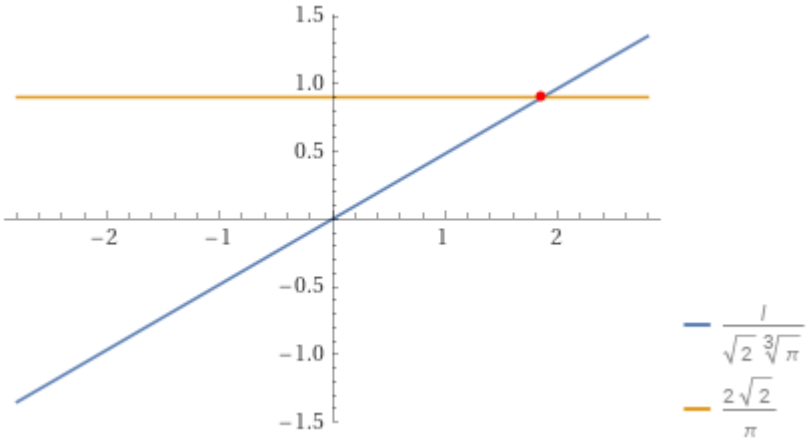
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

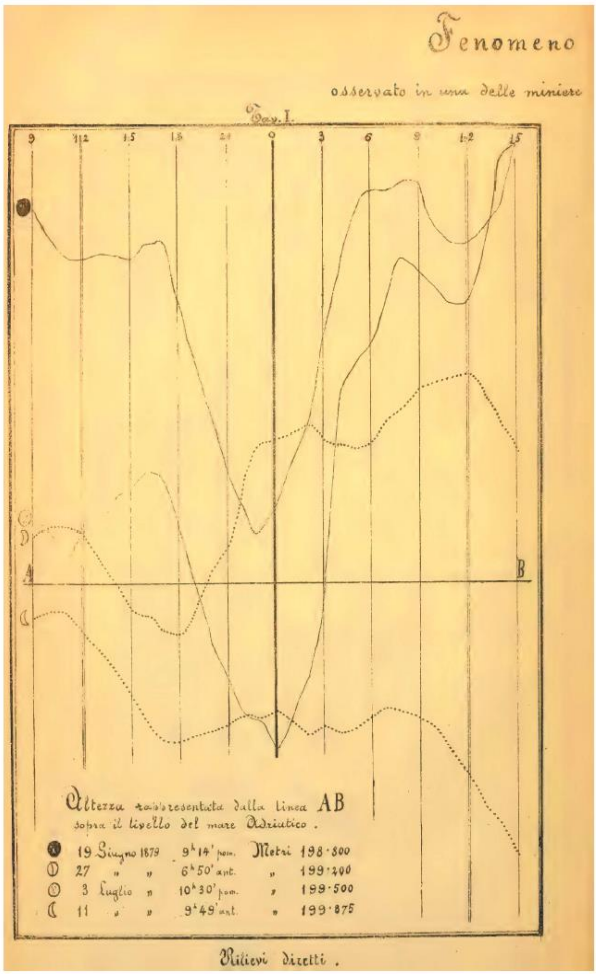
Plot

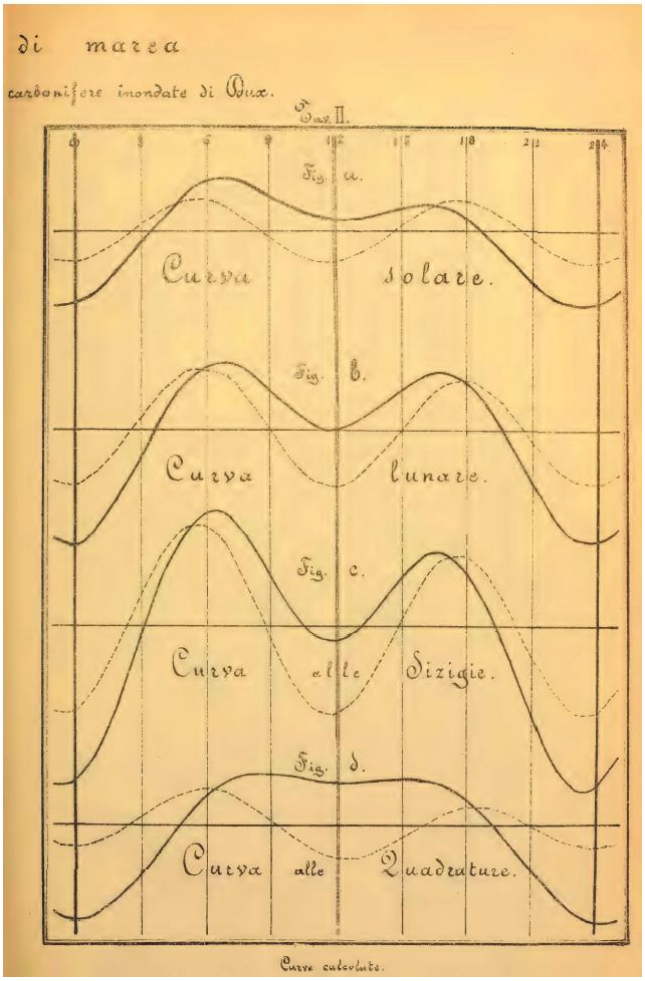


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

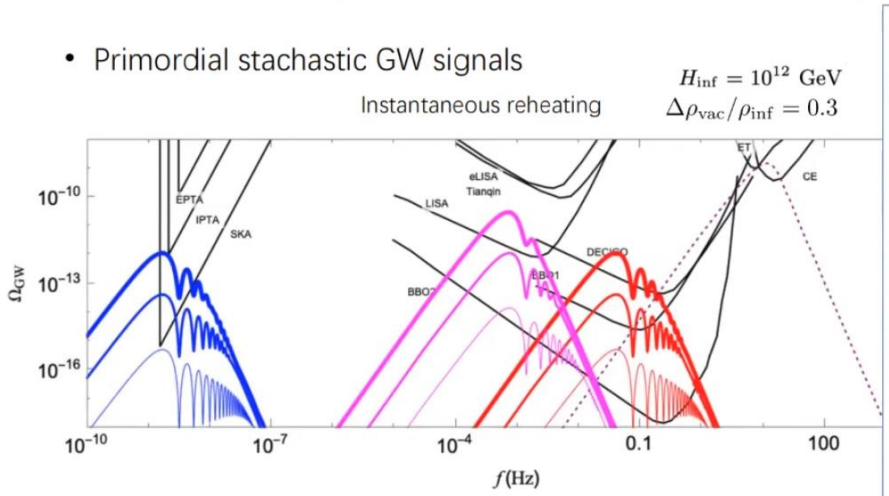

di marea
carbonifere inondate di Pux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

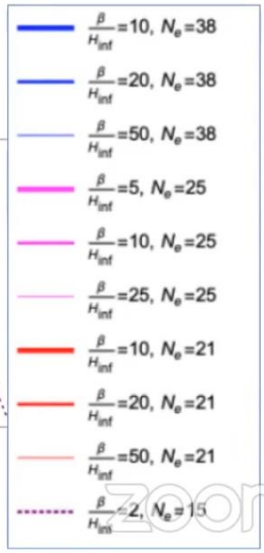
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

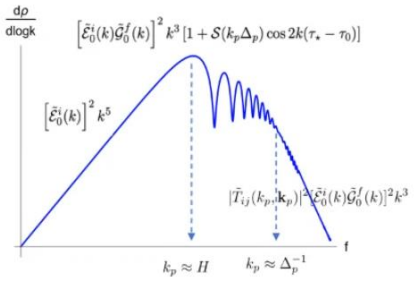
Comparison between primary GW and secondary GW

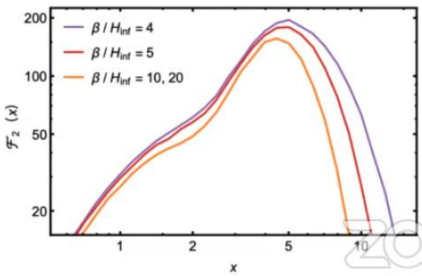
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





From: **"Nuova Teoria sismica delle Maree"** – *Prof. Giulio Grablovitz* – 1876

(In Italian)

L'altro terremoto del 1873, forte esso pure, ma dimenticato dopo quello di Belluno, accadde la sera del 12 marzo alle nove. La scossa iniziale aveva nell'Apennino centrale la direzione SE.—NO.

Nel 1872, l'unico terremoto di cui s'indichi la direzione, è quello avvertito a Firenze la sera dell'8 gennaio alle 10.15; procedeva da Sud a Nord.

Nei primi tre mesi del 1866 avvennero parecchi terremoti in Grecia in direzione E—O.

A tutti questi dati, debbo aggiungerne ancor uno della più grande importanza, ed è che i terremoti in generale (sempre inteso in Italia) arrecano i maggiori danni o si rendono i più sensibili lungo le montagne il cui asse è rivolto verso la Sicilia, cioè nei punti in cui le montagne offrono la maggior resistenza all'elasticità del suolo. Infatti è incontrastabile che il tratto degli Apennini fra il sasso di Simone (presso S. Marino) ed il lago Fucino è il più bersagliato; ne fanno fede i terremoti di Norcia.

From

Dell'Attrazione Luni-Solare in relazione coi fenomeni mareo-sismici – Prof. *Giulio Grablovitz*

(In Italian)

La marea *tellurica* nell'Adriatico è tanto più vigorosa dell'*oceanica,* che questa si può trascurare nell'esame delle ore dei porti, senza cadere in errori di conseguenza nel giudicare il modo ed il tempo della propagazione della prima, mediante i dati originali della marea risultante, esposti al § V.

Da Lesina a Trieste il progresso dell' onda è uniforme; sulla costa occidentale apparisce più lento, poichè l'ora del porto a Venezia ed a Ravenna è posteriore a quella delle coste istriane, in causa del basso fondo che a quelle spiagge ne rallenta il corso; tenendo conto delle profondità del mare, si può calcolare per approssimazione che l' onda, la quale in 5 ore circa compie il tratto da Lesina a Trieste, può aver percorso un tratto piuttosto minore che maggiore nelle 5 ore decorse dal passaggio al meridiano all'ora dell'alta marea a Lesina, per cui anche da questo lato si verrebbe a concludere che l'onda prende le mosse da un punto situato fra la Sicilia e l'Arcipelago Jonio.

Per altro se si considera che a Corfù l' alta marea avviene $4^h\,10'$ dopo il passaggio al meridiano, cioè soli 23 minuti prima che a Lesina, fa meraviglia la prodigiosa velocità della marea in quel tratto; da questa circostanza il prof. Schaub trasse la conseguenza che la marea di Corfù fosse affatto indipendente da quella dell'Adriatico e seguisse le leggi di quella del Mediterraneo. Quest'ipotesi non si conforma certamente alla mia, che suppone il radiante della marea appunto nel mar Jonio.

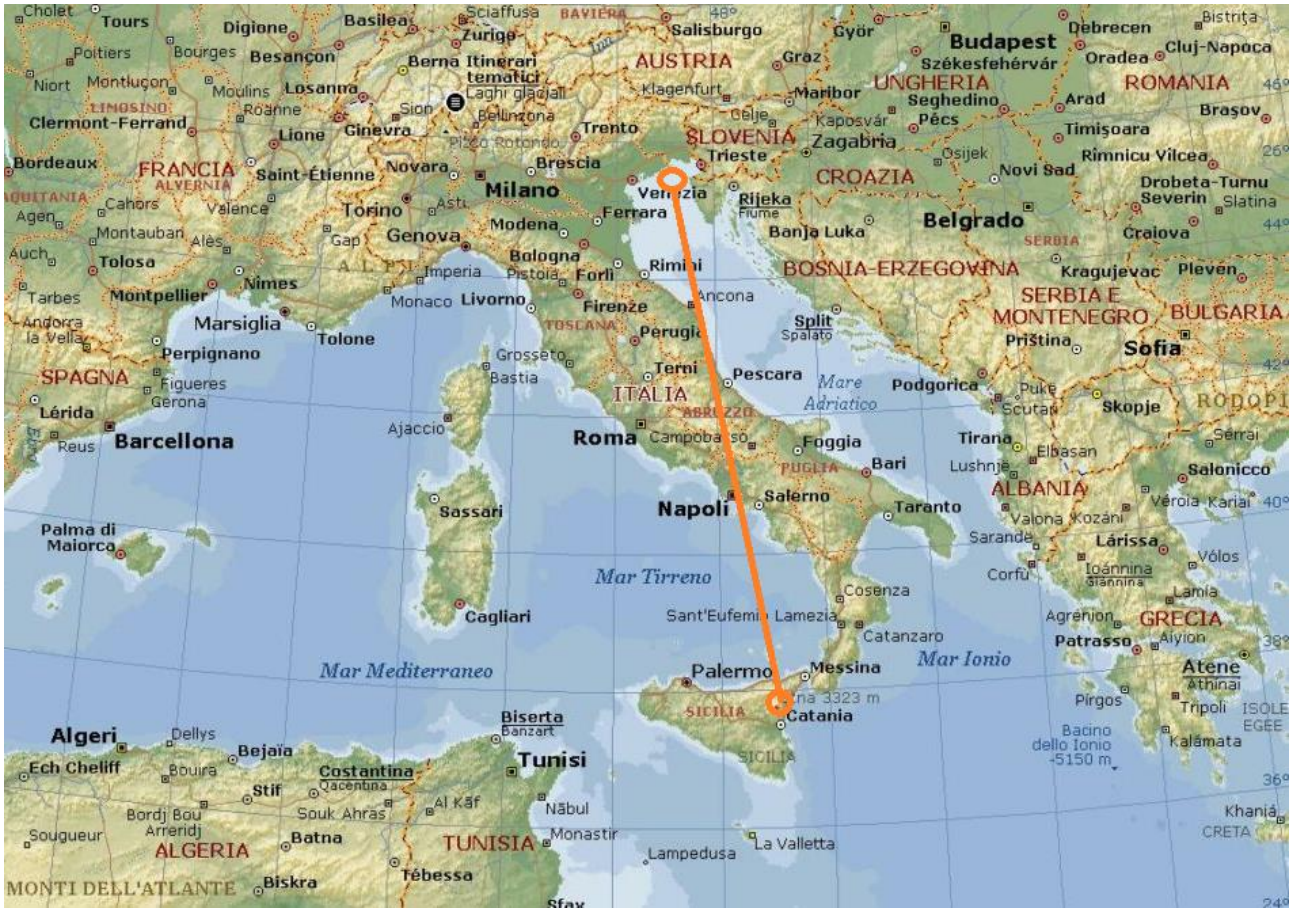
modo si giungerebbe ad una latitudine più prossima ai 38° ch' è quella dell' Etna, presso cui io colloco il radiante della marea adriatica.

(see image below)

Se si prendono ad esaminare le maree d'altre coste lungo il Mediterraneo, si trovano le tracce della marea Adriatica proveniente dal punto di propagazione da me indicato. A Sfax nella Sirti minore l' alta marea ha luogo $4^h\,30'$ dopo il passaggio al meridiano; a Jerba avviene a $3^h\,10'$; a Girgenti, secondo la comunicazione gentilmente fattami dal Sig. Ing. Santini, accade a $2^h\,30'$; queste ore stanno in perfetta armonia col radiante supposto a circa 35° latitudine Nord sulla longitudine che risulterebbe dal prolungamento della penisola italiana.

Nell' opuscolo da me pubblicato lo scorso anno sotto il titolo *Nuova teorica sismica delle maree* ho accennato le Antille come probabile radiante dell' onda principale che batte le coste occidentali europee, nonchè la costa oriental e degli Stati Uniti e ne serbo tuttora piena convinzione.

Grandemente soggette a terremoti sarebbero, a mio avviso, le lunghe catene di montagne il cui asse è diretto verso il radiante, ed in Italia verrebbe in prima linea da questo lato la catena degli Apennini e nella costa orientale dell' Adriatico le Alpi Dinariche; in seconda linea verrebbero i lati Est ed Ovest del semicerchio alpino ossia le Alpi Marittime e le Giulie.



Radiant of the Adriatic tide (connected to earthquakes) which departs from Etna and touches Trieste and Venice, passing through Campania, Molise, Abruzzo, Umbria and Marche

In fact, as we have already read previously:

> A tutti questi dati, debbo aggiungerne ancor uno della più grande importanza, ed è che i terremoti in generale (sempre inteso in Italia) arrecano i maggiori danni o si rendono i più sensibili lungo le montagne il cui asse è rivolto verso la Sicilia, cioè nei punti in cui le montagne offrono la maggior resistenza all'elasticità del suolo. Infatti è incontrastabile che il tratto degli Apennini fra il sasso di Simone (presso S. Marino) ed il lago Fucino è il più bersagliato; ne fanno fede i terremoti di Norcia.

(Norcia in Umbria) Lake Fucino in Abruzzo, just 12.4 km from Avezzano, the scene of a very strong earthquake.

The 1915 Marsica earthquake, also known as the Avezzano earthquake, was a dramatic seismic event that occurred on **13 January 1915** which devastated the historical-geographical region of Marsica, in Abruzzo, and the neighboring areas of contemporary Lazio, such as the Liri valley and the Cicolano. The earthquake, classified among the main earthquakes that occurred in Italy due to its destructive force, affected a large part of central Italy causing damage and victims in several provinces

We note that the terrible earthquake occurred during the waning phase that culminated in the New Moon on 01.15.15

15 Gennaio 1915	**LUNA NUOVA** alle 14:41		24°22′

From

Giulio Grablovitz – **Sulle registrazioni sismiche del 17 Agosto 1906 in Ischia**

The Solar Eclipse of **July 21, 1906** was an astronomical event that took place on the aforementioned day around 1.14 pm UTC. This event took place southeast of the South American continent and at the northern tip of the Antarctic Peninsula.

Partial type

Gamma -1.3637

Magnitude 0.3355

Maximum eclipse coordinates 68.6°S 33.3°W

Times (UTC)

Maximum eclipse 13:14:19

The solar eclipse of **August 20, 1906** was an astronomical event that took place on the aforementioned day around 01:12 UTC. This event took place in northern North America and the northern tip of Russia. The eclipse of August 20, 1906 became the third solar eclipse in 1906 and the 14th in the 20th century. The previous solar eclipse occurred on July 21, 1906, the following on January 14, 1907.

Guy: Partial

Range: 1.3731

Magnitude: 0.3147

Maximum eclipse coordinates: 70.8°N 66.4°W

Times (UTC)

Maximum eclipse: 1:12:50

Now, we calculate:

July 21, 1906 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Saturday, July 21, 1906 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Saturday, September 27, 2014

27.09.2014

August 20, 1906 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Monday, August 20, 1906 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CET | Monday, October 27, 2014

27.10.2014

The solar eclipse of **October 23, 2014** was an astronomical event that occurred from 7:37 pm UTC to 11:51 pm UTC. It was visible from almost all of North America

Tipo	Parziale
Gamma	1,0908

Magnitudine	0,8114
Coordinate eclissi massima	71.2N 97.2W
Orari (UTC)	
Inizio parziale	19:37:30
Eclissi massima	21:45:39
Fine parziale	23:51:36

Earthquakes:

2014-09-05 10:10	Ionio settentrionale
2014-09-07 10:45	Appennino tosco-emiliano
2014-09-25 16:33	Etna - S. Maria la Stella (Aci S. A
2014-09-26 23:38	Ionio meridionale
2014-09-30 23	Etna - Versante orientale
2014-10-09 22:58	Tirreno meridionale

05.09.2014	Lat, Lon	39.170, 18.798
07.09.2014	Lat, Lon	44.119, 10.672
25.09.2014	Lat, Lon	37.618, 15.142
26.09.2014	Lat, Lon	36.918, 16.484
30.09.2014	Lat, Lon	37.650, 15.128
09.10.2014	Lat, Lon	38.541, 14.847

Moon Phases September 2014

2 Settembre 2014	**Primo quarto**		10°22′

9 Settembre 2014	**LUNA PIENA** alle 01:38		16°18′

(1h 38m)

Input interpretation

1 hour 38 minutes

Results

1.633 hours

98 minutes

Unit conversion

5880 seconds

5880 seconds = 1.6333°

24 Settembre 2014	**LUNA NUOVA** alle 06:13		1°07′

(6h 13m)

Input interpretation

6 hours 13 minutes

Results

6.217 hours

373 minutes

Unit conversions

22380 seconds

22380 seconds = 6.216°

Moon Phases October 2014

8 Ottobre 2014	**LUNA PIENA** alle 10:50 **Eclissi lunare**		15°04′

(10h 50m)

Input interpretation

10 hours 50 minutes

Results

10.83 hours

650 minutes

Unit conversions

39000 seconds

39000 seconds = 10.8333°

We have from the sum of the above results:

1.6333° + 6.216° + 10.8333°

Input interpretation

1.6333° (degrees) + 6.216° (degrees) + 10.8333° (degrees)

Result

18.683° (degrees)

18.683°

Unit conversions

326.07 mrad (milliradians)

0.32607 radians

---

18 degrees 40 arcminutes 57 arcseconds

18° 40’ 57”

From the sum of the three declinations and the above result concerning the time of the Full Moon, we obtain:

(10° 22' + 16° 18' + 1° 07' + 10.8333°)

Input interpretation

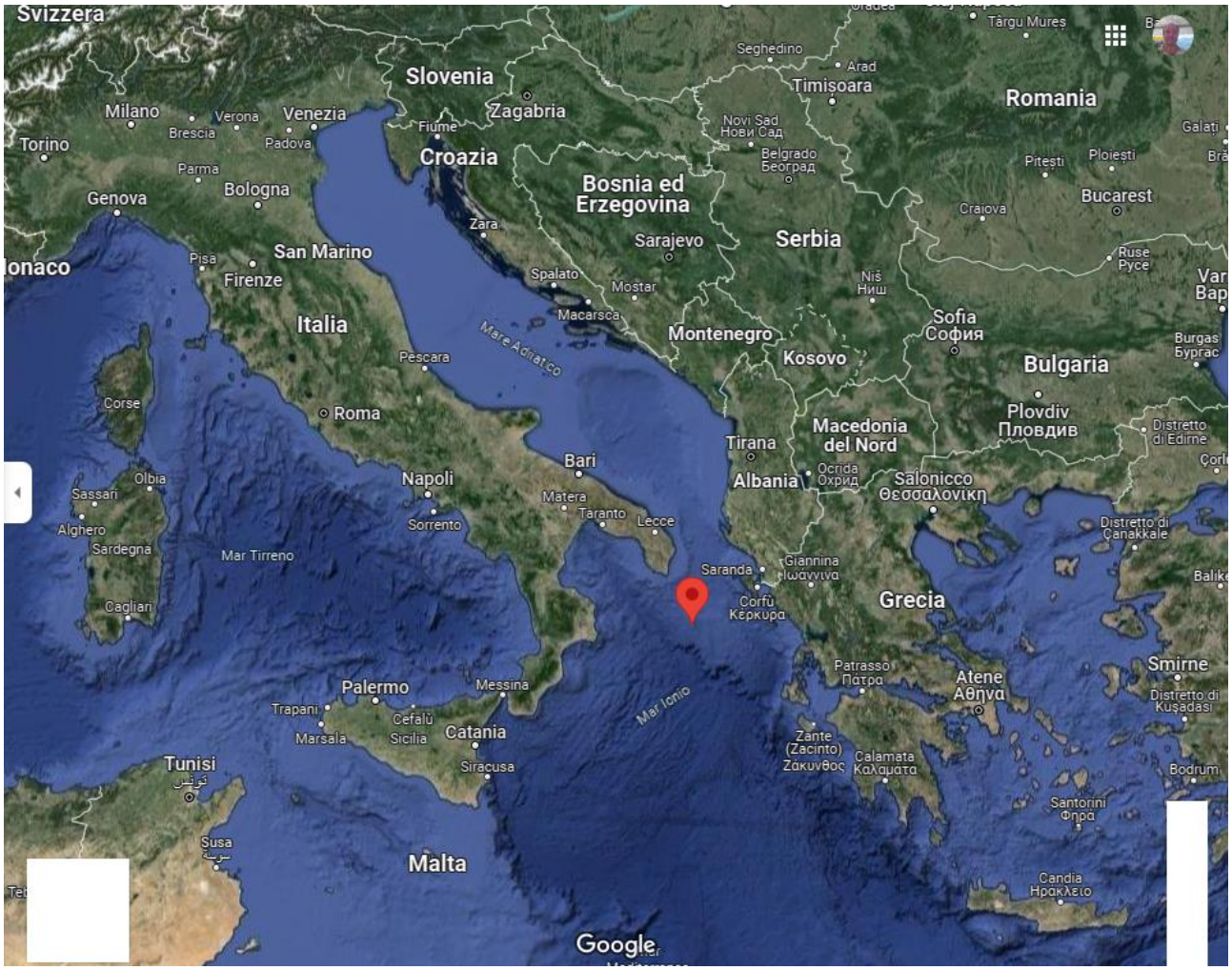
10 degrees 22 arcminutes + 16 degrees 18 arcminutes +
1 degree 7 arcminutes + 10.8333° (degrees)

Results

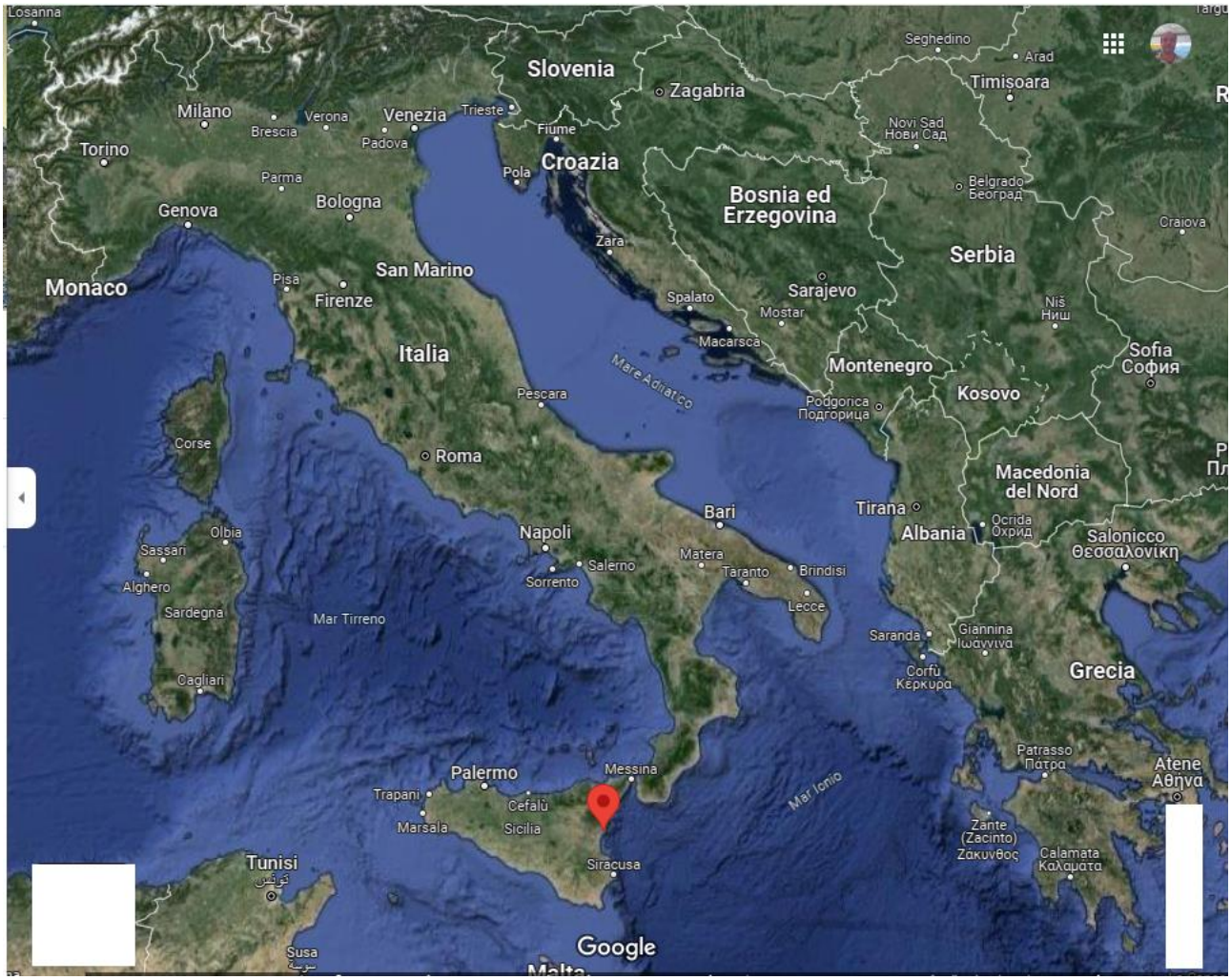
38 degrees 37 arcminutes

38° 37’ N 15° 04’ E = Aeolian Sea

2014-09-05 10:10	Ionio settentrionale
2014-09-07 10:45	Appennino tosco-emiliano
2014-09-25 16:33	Etna - S. Maria la Stella (Aci S. A
2014-09-26 23:38	Ionio meridionale
2014-09-30 23	Etna - Versante orientale
2014-10-09 22:58	Tirreno meridionale

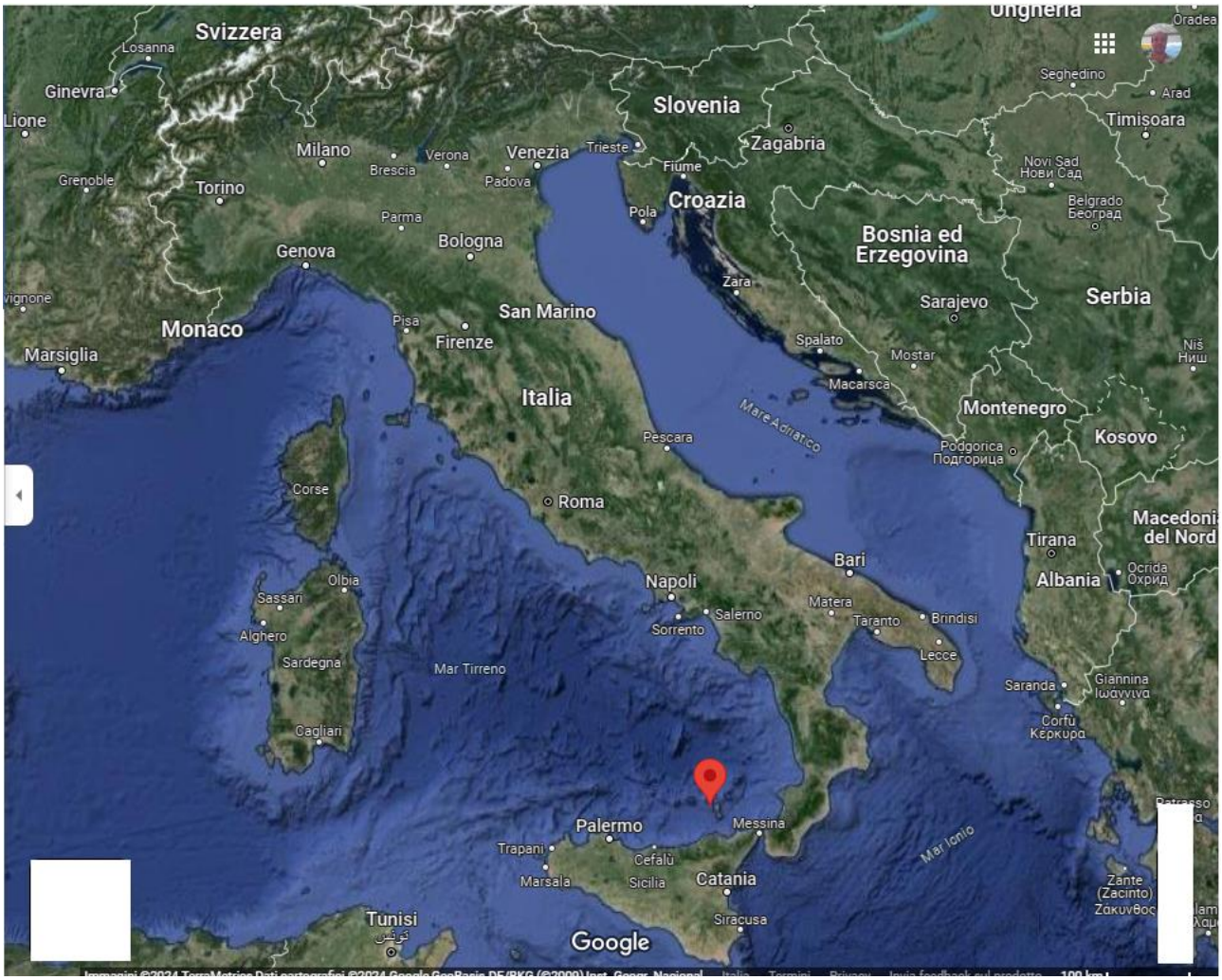


39°10'12.0"N 18°47'52.8"E = Ionian Sea



37°37'04.8"N 15°08'31.2"E = Acireale (Catania)

37°39'00.0"N 15°07'40.8"E = Pennisi (Catania)



38°32'27.6"N 14°50'49.2"E = Salina Island (Aeolian Sea), Leni (Messina)

From

Sulle registrazioni sismiche del 17 Agosto 1906 in Ischia – *Prof. Giulio Grablovitz*

The solar eclipse of **August 20, 1906** was an astronomical event that took place on the aforementioned day around 01:12 UTC. This event took place in northern North America and the northern tip of Russia. The eclipse of August 20, 1906 became the third solar eclipse in 1906 and the 14th in the 20th century. The previous solar eclipse occurred on July 21, 1906, the following on January 14, 1907.

16 agosto 1906 19:48 Valparaíso

Magnitudo	Prof.	Distanza	Posiz.
8.2	35	137 km	Valparaíso, Cile

6h diff. Italy = August, 17 1h 48m

12 Agosto 1906	**Ultimo quarto**		23°02′

20 Agosto 1906	**LUNA NUOVA** alle 01:27 **Eclissi solare**		26°06′

July, 2 1906, 7.50pm Montemurro earthquake

Date 1906-07-02 19:50

	Lat, Lon	40.297, 15.991
	MDP set	► 15 MDPs Imax 5 MCS Camassi, 2001a
	Io	4
	Mw	3.78 ± 0.52

33°03′00.36″ S 71°37′00″ W

Nelle prime ore del 17 agosto 1906 si ebbero vistose registrazioni in tutte le stazioni sismiche sparse pel globo e non erano trascorse 24 ore che i giornali d' Europa recavano il tremendo annunzio della distruzione di Valparaiso. Niun dubbio poteva a bella prima sorgere che quelle registrazioni fossero dovute non ad altro epicentro che a quello evidentissimo della catastrofe cilena, senonchè qualche speciale caratteristica nei sismogrammi rivelava la sovrapposizione di due terremoti lontani, i cui primi impulsi sarebbero giunti in Europa ad 1^h24^m e ad 1^h59^m incirca. E dopo più attento esame fu tale la mia sicurezza che nella giornata stessa ne diedi comunicazione ufficiale al R. Ufficio Centrale di Meteorologia e Geodinamica con le seguenti fasi approssimative:

	I Terremoto	II Terremoto
Principio	$1^h24.6^m$	$1^h59.7^m$
Seconda fase	1 35.6	2 8.9
Preludio III fase . . .	1 48.0	2 39.0
Principio fase principale	2 5.0	2 49.0
Massimo.	2 10.0	2 52.0
Fine	Indeterminata	3 25.0

Sarebbe rimasta in questione l' interpretazione, vale a dire:

a) se si trattasse d' un singolo terremoto giunto dai due lati opposti del cerchio massimo;

b) se i terremoti fossero due, ma d' uno stesso epicentro;

c) se i medesimi, essendo due, avessero due distinti epicentri.

La terza ipotesi, dopo maturo esame, mi sembrò la più verosimile, salvo a decidere in base a notizie d' altrove quale dei due terremoti spettasse realmente a Valparaiso. Intanto conveniva confrontare le indicazioni avute da più strumenti nell' isola d' Ischia e fissare gl' istanti delle varie fasi con maggior cura; a tale intento furono analizzati attentamente i sismogrammi delle *rasche* e dei *pendoli orizzontali* a registrazione meccanica continua sul nero fumo in entrambe le stazioni sismiche.

Il primo impulso, incerto agli *orizzontali* per la loro poca amplificazione (1 a 8) è dato con tutta sicurezza ad ambo le componenti delle *rasche* ad $1^h23^m45^s$ e vi tengono dietro parecchie oscillazioni che dopo mezzo minuto raggiungono la massima ampiezza di 1 a 2 mm. per poi decrescere, senza estinguersi del tutto fino all' arrivo della seconda fase, la quale riesce manifesta a tutti gli apparecchi, cioè:

Porto d' Ischia:	Vasca =	$1^h34^m47^s$
	Orizz. =	1 34 45
Grande Sentinella:	Vasca =	1 34 46
	Orizz. =	1 34 45
Media		**1 34 46**

I moti della seconda fase, più rallentati di quelli della prima, perdurano con ampiezza uniforme per un pajo di minuti e poi vanno decrescendo e trasformandosi in oscil-

lazioni irregolari sempre più lente, fino all' incerto apparire delle oscillazioni lentissime preludenti alla fase principale. L' ingresso di queste è generalmente mal definito per la loro poca ampiezza, pel loro lungo periodo, talvolta superiore ad un minuto sul principio, e per la sovrapposizione dei moti residui della fase precedente. Nel caso attuale, come si vedrà, va decrescendo da 53' a 20' ed esse in generale sono più sentite alla componente del primo verticale che a quella del meridiano; in questa, forse per tale ragione, si rendono apprezzabili più tardi, specialmente alle *rasche*, in cui per ragioni strumentali riescono più appiattite, cioè:

	EW	NS
Porto d' Ischia: Vasca	1h51m38s	1h58m29s
Orizz.	1 51 15	1 58 45
Gr. Sentinella: Vasca	1 51 45	1 58 57
Orizz.	1 50 51	1 52 13
	1 51 20	**1 55 58**

Queste oscillazioni hanno un periodo medio di 32' a tutti gli apparecchi, ma in qualcuno sono precedute da oscillazioni molto appiattite del periodo di 48' incirca.

La fase principale che segue, si compone di belle sinusoidi, il cui periodo da 19' va successivamente decrescendo fino a 15'; essa fa il suo ingresso abbastanza chiaramente negl' istanti seguenti:

	EW	NS
Porto d' Ischia: Vasca	2h2m55s	2h2m55s
Orizz.	2 3 51	2 3 53
Gr. Sentinella: Vasca	2 3 28	2 3 32
Orizz.	2 3 21	2 3 28
Medie parziali	2 3 25	2 3 27
Media generale	**2h3m26s**	

From the above Tables, we obtain:

(2h 2m 55s – 1h 51m 28s)

Input interpretation

2 hours 2 minutes 55 seconds – 1 hour 51 minutes 28 seconds

Results

11 minutes 27 seconds

0.1908 hours

---

687 seconds

11.45 minutes

(2h 3m 54s – 1h 51m 15s)

Input interpretation

2 hours 3 minutes 54 seconds – 1 hour 51 minutes 15 seconds

Results

12 minutes 39 seconds

0.2108 hours

759 seconds

12.65 minutes

(2h 3m 28s – 1h 51m 45s)

Input interpretation

2 hours 3 minutes 28 seconds – 1 hour 51 minutes 45 seconds

Results

11 minutes 43 seconds

0.1953 hours

---

703 seconds

11.72 minutes

(2h 3m 21s – 1h 50m 51s)

Input interpretation

2 hours 3 minutes 21 seconds – 1 hour 50 minutes 51 seconds

Results

12 minutes 30 seconds

0.2083 hours

---

750 seconds

12.5 minutes

(687+759+703+750)/4 seconds

Input interpretation

$\frac{1}{4}$ (687 + 759 + 703 + 750) seconds

Result

724.8 seconds

724.8

Unit conversions

12 minutes 4.75 seconds

12.08 minutes

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

2.173×10^8 km (kilometers)

1.5 au (astronomical units)

2.173×10^{11} meters

135 million miles

Frequency ν from $\nu = 1/T$:

0.0014 Hz (hertz)

(2h 2m 55s – 1h 58m 29s)

Input interpretation

2 hours 2 minutes 55 seconds – 1 hour 58 minutes 29 seconds

Results

4 minutes 26 seconds

0.07389 hours

---

266 seconds

4.433 minutes

(2h 3m 53s – 1h 58m 45s)

Input interpretation

2 hours 3 minutes 53 seconds – 1 hour 58 minutes 45 seconds

Results

5 minutes 8 seconds

0.08556 hours

---

308 seconds

5.133 minutes

(2h 3m 32s – 1h 58m 57s)

Input interpretation

2 hours 3 minutes 32 seconds – 1 hour 58 minutes 57 seconds

Results

4 minutes 35 seconds

0.07639 hours

---

275 seconds

4.583 minutes

(2h 3m 28s – 1h 52m 13s)

Input interpretation

2 hours 3 minutes 28 seconds – 1 hour 52 minutes 13 seconds

Results

11 minutes 15 seconds

0.1875 hours

---

675 seconds

11.25 minutes

(266 + 308 + 275 + 675)/4 seconds

Input interpretation

$\frac{1}{4}$ (266 + 308 + 275 + 675) seconds

Result

381 seconds

381

Unit conversions

6 minutes 21 seconds

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.142×10^8 km (kilometers)

0.76 au (astronomical units)

1.142×10^{11} meters

70.97 million miles

Frequency ν from $\nu = 1/T$:

0.0026 Hz (hertz)

1/2((687+759+703+750)/4 seconds + (266 + 308 + 275 + 675)/4 seconds)

Result

552.9 seconds

552.9

Unit conversions

9 minutes 12.88 seconds

9.215 minutes

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.657×10^8 km (kilometers)

1.1 au (astronomical units)

1.657×10^{11} meters

103 million miles

Frequency ν from $\nu = 1/T$:

0.0018 Hz (hertz)

From which:

8(1/2((687+759+703+750)/4 + (266 + 308 + 275 + 675)/4))-322-3-2

Input

$$8\left(\frac{1}{2}\left(\frac{1}{4}(687+759+703+750)+\frac{1}{4}(266+308+275+675)\right)\right)-322-3-2$$

Exact result

4096

4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality.

The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

27sqrt(8(1/2((687+759+703+750)/4 + (266 + 308 + 275 + 675)/4))-322-3-2)+1

Input

$$27\sqrt{8\left(\frac{1}{2}\left(\frac{1}{4}(687+759+703+750)+\frac{1}{4}(266+308+275+675)\right)\right)-322-3-2}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron.

As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(27sqrt(8(1/2((687+759+703+750)/4 + (266 + 308 + 275 + 675)/4))-322-3-2)+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\left(27\sqrt{\left(8\left(\frac{1}{2}\left(\frac{1}{4}(687+759+703+750)+\frac{1}{4}(266+308+275+675)\right)\right)-322-3-2\right)}+1\right)\text{ ^ }(1/15)+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Exact result

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi} + \sqrt[15]{1729}$$

Decimal approximation

1.64493802413026025794173319194636695742024244172581638027130567 82

…

1.64493802413…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate form

$$C_{\text{MRB}}^{\,-1/(4\pi)}\left(\sqrt[15]{1729}\;\sqrt[4\pi]{C_{\text{MRB}}} + C_{\text{MRB}}^{\,1+\pi}\right)$$

(1/2((1h 51m 20s) + (1h 55m 58s)))

Input interpretation

$$\frac{1}{2}\,(1\text{ hour }\;51\text{ minutes }\;20\text{ seconds} + 1\text{ hour }\;55\text{ minutes }\;58\text{ seconds})$$

Results

1 hour 53 minutes 39 seconds

1.894 hours

6819 seconds

113.7 minutes

(2h 3m 26s)-(1 hour 53 minutes 39 seconds)

Input interpretation

2 hours 3 minutes 26 seconds – 1 hour 53 minutes 39 seconds

Results

9 minutes 47 seconds

0.1631 hours

---

587 seconds

587 seconds = 0.1630555555556°

9.783 minutes

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.76×10^8 km (kilometers)

1.2 au (astronomical units)

1.76×10^{11} meters

109.3 million miles

Frequency ν from $\nu = 1/T$:

0.0017 Hz (hertz)

0.1630555555556°

Input interpretation

0.1630555555556° (degrees)

Unit conversions

2.84585630811 mrad (milliradians)

0.00284585630811 radians

---

9 arcminutes 47 arcseconds

9.78333333334' (arcminutes)

From which:

5/(0.00284585630811)-29+1

Input interpretation

$$\frac{5}{0.00284585630811} - 29 + 1$$

Result

1728.940428000954626174293474244107098408409248178764682275144 5414

…

1728.940428….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$.

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

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But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(5/(0.00284585630811)-29+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\sqrt[15]{\frac{5}{0.00284585630811} - 29 + 1} + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.644934248270…

1.64493424827…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

(1/27(5/(0.00284585630811)-29))^2+1/π

Input interpretation

$$\left(\frac{1}{27}\left(\frac{5}{0.00284585630811} - 29\right)\right)^2 + \frac{1}{\pi}$$

Result

4096.03589935…

4096.03589935…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above.

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Alternative representations

$$\left(\frac{1}{27}\left(\frac{5}{0.002845856308110000}-29\right)\right)^2+\frac{1}{\pi}=\frac{1}{180^\circ}+\left(\frac{1}{27}\left(-29+\frac{5}{0.002845856308110000}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\frac{5}{0.002845856308110000}-29\right)\right)^2+\frac{1}{\pi}=-\frac{1}{i\log(-1)}+\left(\frac{1}{27}\left(-29+\frac{5}{0.002845856308110000}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\frac{5}{0.002845856308110000}-29\right)\right)^2+\frac{1}{\pi}=\frac{1}{\cos^{-1}(-1)}+\left(\frac{1}{27}\left(-29+\frac{5}{0.002845856308110000}\right)\right)^2$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\left(\frac{1}{27}\left(\frac{5}{0.002845856308110000}-29\right)\right)^2+\frac{1}{\pi}=4095.717589465188+\frac{1}{4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\left(\frac{1}{27}\left(\frac{5}{0.002845856308110000}-29\right)\right)^2+\frac{1}{\pi}=4095.717589465188+\frac{1}{-2+2\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\left(\frac{1}{27}\left(\frac{5}{0.002845856308110000}-29\right)\right)^2+\frac{1}{\pi}=4095.717589465188+\frac{1}{\sum_{k=0}^{\infty}\frac{2^{-k}(-6+50k)}{\binom{3k}{k}}}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\left(\frac{1}{27}\left(\frac{5}{0.002845856308110000}-29\right)\right)^2+\frac{1}{\pi}=4095.717589465188+\frac{1}{2\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\left(\frac{1}{27}\left(\frac{5}{0.002845856308110000}-29\right)\right)^2+\frac{1}{\pi}=4095.717589465188+\frac{1}{4\int_0^1\sqrt{1-t^2}\,dt}$$

$$\left(\frac{1}{27}\left(\frac{5}{0.002845856308110000}-29\right)\right)^2+\frac{1}{\pi}=4095.717589465188+\frac{1}{2\int_0^{\infty}\frac{\sin(t)}{t}\,dt}$$

We have:

e vi tengono dietro, specialmente agli *orizzontali*, vari massimi ad intervalli brevi, mentre alle *vasche* le oscillazioni si dispongono a gruppi molto più ordinati e durevoli; la causa di tale diversità di contegno risiede unicamente nelle condizioni strumentali, come dimostrerò più oltre; ecco intanto i massimi principali con le ampiezze effettive:

Massimi dei gruppi:		*a*		*b*		*c*	
Porto d'Ischia:	Vasca EW	$2^h 8^m 44^s$	1.6	$2^h 8^m 17^s$	0.8	$2^h 14^m 46^s$	0.4
	» NS	2 3 36	1.1	2 9 0	1.5	2 15a20	1.1
	Orizz. EW	2 4 56	5.0	2 8 13	5.6	vari	
	» NS	2 4 39	0.7	2 11 17	2.7	»	
Gr. Sentinella:	Vasca EW	2 4 7	2.0	2 8 57	1.1	2 14 51	0.8
	» NS	2 4 1	1.2	2 9 17	1.5	2 15a20	0.6
	Orizz. EW	2 4 3	1.3	2 9 27	2.1	vari	
	» NS	2 4 29	1.6	2 9 29	1.2	»	
	Medie:	$2^h 4^m 12^s$		$2^h 9^m 15^s$		$2^h 17^m$—	

(2h 4m 12s + 2h 9m 15s + 2h 17m)/3

Input interpretation

$\frac{1}{3}$ (2 hours 4 minutes 12 seconds + 2 hours 9 minutes 15 seconds + 2 hours 17 minutes)

Results

2 hours 10.15 minutes

2.169 hours

7809 seconds

7809 seconds = 2.169166666667°

130.2 minutes

Unit conversion

2 hours 10 minutes 9 seconds

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

2.341×10^9 km (kilometers)

2.341×10^{12} meters

16 au (astronomical units)

1.455 billion miles

Frequency ν from $\nu = 1/T$:

1.3×10^{-4} Hz (hertz)

2.169166666667°

Input interpretation

2.169166666667° (degrees)

Unit conversions

37.8591003578 mrad (milliradians)

0.0378591003578 radians

---

2 degrees 10 arcminutes 9 arcseconds

8^{m} 40.6^{s} (right ascension)

2.41018518519 grads
(unit officially deprecated)

From which:

64/(0.0378591003578)+34+5-1/2

Input interpretation

$$\frac{64}{0.0378591003578} + 34 + 5 - \frac{1}{2}$$

Result

1728.97862720314923457539148761922300661774865837195099816202532 17
…

1728.9786272….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string.

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(64/(0.0378591003578)+34+5-1/2)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\sqrt[15]{\frac{64}{0.0378591003578}+34+5-\frac{1}{2}}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.644936669469…

1.644936669469…. ≈ $\zeta(2) = \pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

(1/27((64/(0.0378591003578)+34+5-1/2)-1))^2

Input interpretation

$$\left(\frac{1}{27}\left(\left(\frac{64}{0.0378591003578}+34+5-\frac{1}{2}\right)-1\right)\right)^2$$

Result

4095.898677737832921696353131736724795357071495216899158085600489 5

…

4095.8986777378…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality.

The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

We have:

	I Terremoto		II Terremoto	
	Istante	Decorr.ª	Istante	Decorr.ª
P = Primo impulso . . .	1ʰ23ᵐ45ˢ	0ᵐ 0ˢ	1ʰ58ᵐ50ˢ	0ᵐ 0ˢ
S = Seconda fase	1 34 45	11 0	2 10 14	11 24
I = Inizio della fase princ.	1 51 20	27 35	2 37 11	38 21
L = Oscillaz. lente ampie.	2 3 26	39 41	2 44 6	45 16
M_1 = Primo massimo. . .	2 4 12	40 27	2 51 12*	52 22
M_2 = Secondo massimo . .	2 9 15*	45 30	2 58 6	59 16
F = Fine	indeterminabile		4 30 —	—

N. B. — L'asterisco contrassegna il massimo più pronunciato.

We have also:

		I Terremoto	II Terremoto
1) Formola Omori	da S — P	Ch. 9926	Ch. 10336
2) » Stiattesi	idem	» 10361	» 10824
3) Diagramma Oldham	idem	» 12222?	» 12222?
» »	da L — P	» 11019	» 12322
» »	» M_* — P	» 10233	» 10439
4) Sviluppo a potenze	» S — P	» 10202	» 10606
	» L — P	» 10744	» 12011
	» M — P	» 10230	» 11546
		Ch. 10388	Ch. 11155

Soltanto l'osservatorio d'Apia nell'arcipelago di Samoa, quasi ai nostri antipodi, distingue letteralmente due terremoti e ne rilevo le seguenti fasi principali, cioè:

	I	II
P =	1ʰ21ᵐ43ˢ	1ʰ49ᵐ42ˢ e 1ʰ54ᵐ42ˢ
S =	1 30 27	2 1 54 » 2 6 42
L =	1 36 —	2ʰ 8ᵐ 0ˢ
M_1 =	1 39 54	2 25 42*
M_2 =	1 43 24*	2 28 0

ed attribuisce senza reticenze il primo ad un terremoto sottomarino al nord-est d'Hawai (is. Sandwich) ed il secondo a Valparaiso, con due scosse iniziali, di cui la seconda corrisponde a quella più sopra menzionata, mentre della prima pure si scorge qualche indizio alle *vasche*.

I particolari della stazione d'Apia confermano dunque pienamente il fatto di due epicentri distinti e precisamente il primo al NE d'Hawai ed il secondo nel Cile.

Considerando che la costa americana al NE d'Hawai dista da noi 9000 ch., mentre l'isola stessa è a circa ch. 13000, la distanza dell'epicentro non dovrebbe differire pel primo terremoto d'un migliajo dalla media distanza di ch. 11000 e ciò è confermato dai calcoli più sopra esposti. Così pure pel secondo terremoto, Valparaiso dista ch. 12000, cui maggiormente si avvicinano le cifre desunte dall'ingresso delle oscillazioni lente.

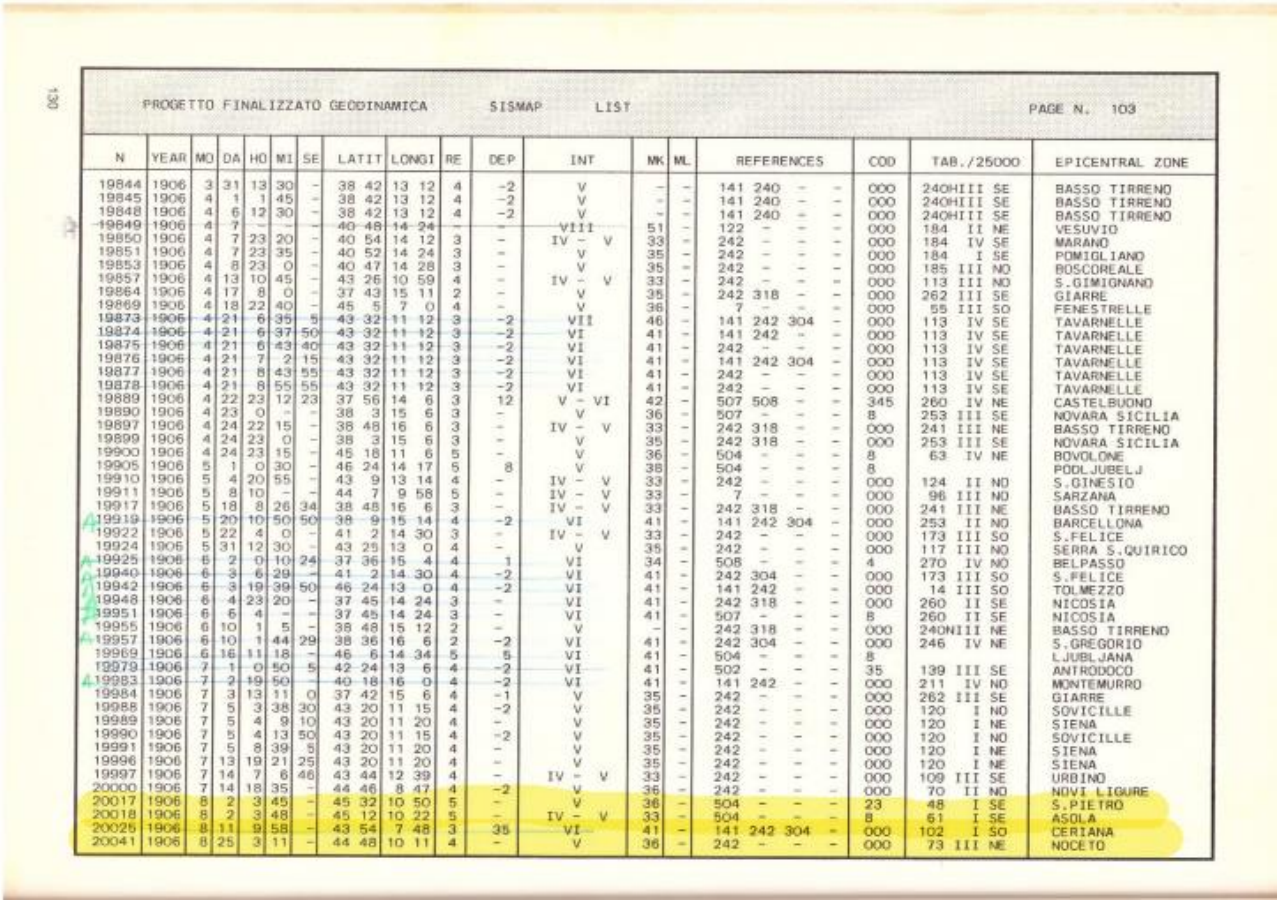
Ischia, novembre 1906.

We observe the following geographical map

And again:

The solar eclipse of **August 20, 1906** was an astronomical event that took place on the aforementioned day around 01:12 UTC.

We note that in August-September 1906, various earthquakes occurred:



PROGETTO FINALIZZATO GEODINAMICA — SISMAP — LIST — PAGE N. 103

N	YEAR	MO	DA	HO	MI	SE	LATIT	LONGI	RE	DEP	INT	MK	ML	REFERENCES	COD	TAB./25000	EPICENTRAL ZONE
19844	1906	3	31	13	30	-	38 42	13 12	4	-2	V	-	-	141 240 - -	000	240HIII SE	BASSO TIRRENO
19845	1906	4	1	1	45	-	38 42	13 12	4	-2	V	-	-	141 240 - -	000	240HIII SE	BASSO TIRRENO
19848	1906	4	6	12	30	-	38 42	13 12	4	-2	V	-	-	141 240 - -	000	240HIII SE	BASSO TIRRENO
19849	1906	4	7	-	-	-	40 48	14 24	-	-	VIII	51	-	122 - - -	000	184 II NE	VESUVIO
19850	1906	4	7	23	20	-	40 54	14 12	3	-	IV - V	33	-	242 - - -	000	184 IV SE	MARANO
19851	1906	4	7	23	35	-	40 52	14 24	3	-	V	35	-	242 - - -	000	184 I SE	POMIGLIANO
19853	1906	4	8	23	0	-	40 47	14 28	3	-	V	35	-	242 - - -	000	185 III NO	BOSCOREALE
19857	1906	4	13	10	45	-	43 26	10 59	4	-	IV - V	33	-	242 - - -	000	113 III NO	S.GIMIGNANO
19864	1906	4	17	8	0	-	37 43	15 11	2	-	V	35	-	242 318 - -	000	262 III SE	GIARRE
19869	1906	4	18	22	40	-	45 5	7 0	4	-	V	36	-	7 - - -	000	55 III SO	FENESTRELLE
19873	1906	4	21	6	35	5	43 32	11 12	3	-2	VII	46	-	141 242 304 -	000	113 IV SE	TAVARNELLE
19874	1906	4	21	6	37	50	43 32	11 12	3	-2	VI	41	-	141 242 - -	000	113 IV SE	TAVARNELLE
19875	1906	4	21	6	43	40	43 32	11 12	3	-2	VI	41	-	242 - - -	000	113 IV SE	TAVARNELLE
19876	1906	4	21	7	2	15	43 32	11 12	3	-2	VI	41	-	141 242 304 -	000	113 IV SE	TAVARNELLE
19877	1906	4	21	8	43	55	43 32	11 12	3	-2	VI	41	-	242 - - -	000	113 IV SE	TAVARNELLE
19878	1906	4	21	8	55	55	43 32	11 12	3	-2	VI	41	-	242 - - -	000	113 IV SE	TAVARNELLE
19889	1906	4	22	23	12	23	37 56	14 6	3	12	V - VI	42	-	507 508 - -	345	260 IV NE	CASTELBUONO
19890	1906	4	23	0	-	-	38 3	15 6	3	-	V	36	-	507 - - -	8	253 III SE	NOVARA SICILIA
19897	1906	4	24	22	15	-	38 48	16 6	3	-	IV - V	33	-	242 318 - -	000	241 III NE	BASSO TIRRENO
19899	1906	4	24	23	0	-	38 3	15 6	3	-	V	35	-	242 318 - -	000	253 III SE	NOVARA SICILIA
19900	1906	4	24	23	15	-	45 18	11 6	5	-	V	36	-	504 - - -	8	63 IV NE	BOVOLONE
19905	1906	5	1	0	30	-	46 24	14 17	5	8	V	38	-	504 - - -	8		PODLJUBELJ
19910	1906	5	4	20	55	-	43 9	13 14	4	-	IV - V	33	-	242 - - -	000	124 II NO	S.GINESIO
19911	1906	5	8	10	-	-	44 7	9 58	5	-	IV - V	33	-	7 - - -	000	96 III NO	SARZANA
19917	1906	5	18	8	26	34	38 48	16 6	3	-	IV - V	33	-	242 318 - -	000	241 III NE	BASSO TIRRENO
19919	1906	5	20	10	50	50	38 9	15 14	4	-2	VI	41	-	141 242 304 -	000	253 II NO	BARCELLONA
19922	1906	5	22	4	0	-	41 2	14 30	3	-	IV - V	33	-	242 - - -	000	173 III SO	S.FELICE
19924	1906	5	31	12	30	-	43 25	13 0	4	-	V	35	-	242 - - -	000	117 III NO	SERRA S.QUIRICO
19925	1906	6	2	0	10	24	37 36	15 4	4	1	VI	34	-	508 - - -	4	270 IV NO	BELPASSO
19940	1906	6	3	6	29	-	41 2	14 30	4	-2	VI	41	-	242 304 - -	000	173 III SO	S.FELICE
19942	1906	6	3	19	39	50	46 24	13 0	4	-2	VI	41	-	141 242 - -	000	14 III SO	TOLMEZZO
19948	1906	6	4	23	20	-	37 45	14 24	3	-	VI	41	-	242 318 - -	000	260 II SE	NICOSIA
19951	1906	6	6	4	-	-	37 45	14 24	3	-	VI	41	-	507 - - -	8	260 II SE	NICOSIA
19955	1906	6	10	1	5	-	38 48	15 12	2	-	V	-	-	242 318 - -	000	240NIII NE	BASSO TIRRENO
19957	1906	6	10	1	44	29	38 36	16 6	2	-2	VI	41	-	242 304 - -	000	246 IV NE	S.GREGORIO
19969	1906	6	16	11	18	-	46 6	14 34	5	5	VI	41	-	504 - - -	8		LJUBLJANA
19979	1906	7	1	0	50	5	42 24	13 6	4	-2	VI	41	-	502 - - -	35	139 III SE	ANTRODOCO
19983	1906	7	2	19	50	-	40 18	16 0	4	-2	VI	41	-	141 242 - -	000	211 IV NO	MONTEMURRO
19984	1906	7	3	13	11	0	37 42	15 6	4	-1	V	35	-	242 - - -	000	262 III SE	GIARRE
19988	1906	7	5	3	38	30	43 20	11 15	4	-2	V	35	-	242 - - -	000	120 I NO	SOVICILLE
19989	1906	7	5	4	9	10	43 20	11 20	4	-	V	35	-	242 - - -	000	120 I NE	SIENA
19990	1906	7	5	4	13	50	43 20	11 15	4	-2	V	35	-	242 - - -	000	120 I NO	SOVICILLE
19991	1906	7	5	8	39	5	43 20	11 20	4	-	V	35	-	242 - - -	000	120 I NE	SIENA
19996	1906	7	13	19	21	25	43 20	11 20	4	-	V	35	-	242 - - -	000	120 I NE	SIENA
19997	1906	7	14	7	6	46	43 44	12 39	4	-	IV - V	33	-	242 - - -	000	109 III SE	URBINO
20000	1906	7	14	18	35	-	44 46	8 47	4	-2	V	36	-	242 - - -	000	70 II NO	NOVI LIGURE
20017	1906	8	2	3	45	-	45 32	10 50	5	-	V	36	-	504 - - -	23	48 I SE	S.PIETRO
20018	1906	8	2	3	48	-	45 12	10 22	5	-	IV - V	33	-	504 - - -	8	61 I SE	ASOLA
20025	1906	8	11	9	58	-	43 54	7 48	3	35	VI	41	-	141 242 304 -	000	102 I SO	CERIANA
20041	1906	8	25	3	11	-	44 48	10 11	4	-	V	36	-	242 - - -	000	73 III NE	NOCETO

02.08.1906 San Pietro (Prov. Verona, Veneto) 02.08.1906 Asola (Prov. Mantova, Lombardia) 11.08.1906 Ceriana (Prov. Imperia, Liguria) 25.08.1906 Noceto (Prov. Parma, Emila-Romagna)

02.08.1906	Veneto – Lombardia	45° 32’ N 10° 50’ E - 45° 13’ N 10° 25’ E
11.08.1906	Liguria	43° 54’ N 7° 48’ E
25.08.1906	Emilia-Romagna	44° 48’ N 10° 11’ E

04.08.1906 Full Moon 12h 59m; 11° 12' – Lunar eclipse

11.08.1906 Last quarter moon 11° 06'

08.26.1906 First quarter moon 25° 18'

(12h 59m)

Input interpretation

12 hours 59 minutes

Results

12.98 hours

779 minutes

Unit conversions

46 740 seconds

46740 seconds = 12.98333°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.401×10^{10} km (kilometers)

1.401×10^{13} meters

94 au (astronomical units)

8.707 billion miles

Frequency ν from $\nu = 1/T$:

2.1×10^{-5} Hz (hertz)

Tides Venice 04.08

high low high

(3h 20m)

Input interpretation

3 hours 20 minutes

Results

3.333 hours

200 minutes

Unit conversions

12 000 seconds

12000 seconds = 3.3333°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

3.598×10^9 km (kilometers)

3.598×10^{12} meters

24 au (astronomical units)

2.235 billion miles

Frequency ν from $\nu = 1/T$:

8.3×10^{-5} Hz (hertz)

8.3*10^-5 Hz

(7h 40m)

Input interpretation

7 hours 40 minutes

Results

7.667 hours

460 minutes

Unit conversions

27 600 seconds

27600 seconds = 7.66666°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

8.274×10^9 km (kilometers)

8.274×10^{12} meters

55 au (astronomical units)

5.141 billion miles

Frequency ν from $\nu = 1/T$:

3.6×10^{-5} Hz (hertz)

3.6*10^-5 Hz

(16h 5m)

Input interpretation

16 hours 5 minutes

Results

965 minutes

16.08 hours

Unit conversions

57 900 seconds

57900 seconds = 16.08333°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.736×10^{10} km (kilometers)

1.736×10^{13} meters

116 au (astronomical units)

10.79 billion miles

Frequency ν from $\nu = 1/T$:

1.7×10^{-5} Hz (hertz)

1.7*10^-5 Hz

From the above frequency results, we obtain:

coth(8.3*10^-5 + 3.6*10^-5 + 1.7*10^-5)

Input interpretation

$\coth\left(8.3 \times 10^{-5} + 3.6 \times 10^{-5} + 1.7 \times 10^{-5}\right)$

$\coth(x)$ is the hyperbolic cotangent function

Result

7352.94…

7352.94….

From which:

-72sec(7352.94)+29+π-2

Input interpretation

$-72 \sec(7352.94) + 29 + \pi - 2$

$\sec(x)$ is the secant function

Result

1728.99…

1728.99….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternative representations

$$-72\sec(7352.94)+29+\pi-2=27+\pi-\frac{72}{\cos(7352.94)}$$

$$-72\sec(7352.94)+29+\pi-2=27+\pi-\frac{72}{\cosh(7352.94\,i)}$$

$$-72\sec(7352.94)+29+\pi-2=27+\pi-\frac{72}{\cosh(-7352.94\,i)}$$

$\cosh(x)$ is the hyperbolic cosine function

i is the imaginary unit

Series representations

$$-72\sec(7352.94)+29+\pi-2=27+\pi+144\sum_{k=1}^{\infty}(-1)^k\,q^{-1+2k}$$

for $q=-0.0423816+0.999101\,i$

$$-72\sec(7352.94)+29+\pi-2=27+\pi+72\sum_{k=-\infty}^{\infty}(-1)^k\,e^{-7352.94\,i\,(1+2k)}\,(-1+2\,\theta(k))$$

$$-72\sec(7352.94)+29+\pi-2=27+\pi-72\sum_{k=-\infty}^{\infty}(-1)^k\,e^{7352.94\,i\,(1+2k)}\,(-1+2\,\theta(k))$$

$\theta(x)$ is the Heaviside step function

(-72sec(7352.94)+29+π-2)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$\sqrt[15]{-72\sec(7352.94)+29+\pi-2}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$

sec(x) is the secant function

C_{MRB} is the MRB constant

Result

1.644937582421016279112595643048951935450401765675813315559922983 2…

1.644937582421…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

(1/27((-72sec(7352.94)+29+π-2)-1))^2

Input interpretation

$\left(\frac{1}{27}((-72\sec(7352.94)+29+\pi-2)-1)\right)^2$

sec(x) is the secant function

Result

4095.97…

4095.97…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above.

This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

We have the following algebraic sum:

(3.3333° + 7.66666° + 16.08333°)

Input interpretation

3.3333° (degrees) + 7.66666° (degrees) + 16.08333° (degrees)

Result

27.083° (degrees)

27.083°

Unit conversions

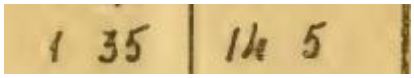
472.69 mrad (milliradians)

0.47269 radians

27 degrees 5 arcminutes

27° 5’

Tides Ischia 04.08



high high

(1h 35m)

Input interpretation

1 hour 35 minutes

Results

1.583 hours

95 minutes

Unit conversion

5700 seconds

5700 seconds = 1.58333°

(14h 5m)

Input interpretation

14 hours 5 minutes

Results

845 minutes

14.08 hours

Unit conversions

50 700 seconds

50700 seconds = 14.08333°

(1.58333° + 14.08333°)

Input interpretation

1.58333° (degrees) + 14.08333° (degrees)

Result

15.6667° (degrees)

15.6667°

Unit conversions

273.435 mrad (milliradians)

0.273435 radians

---

15 degrees 40 arcminutes

15° 40’

(27° 5' + 15° 40')

Input interpretation

27 degrees 5 arcminutes + 15 degrees 40 arcminutes

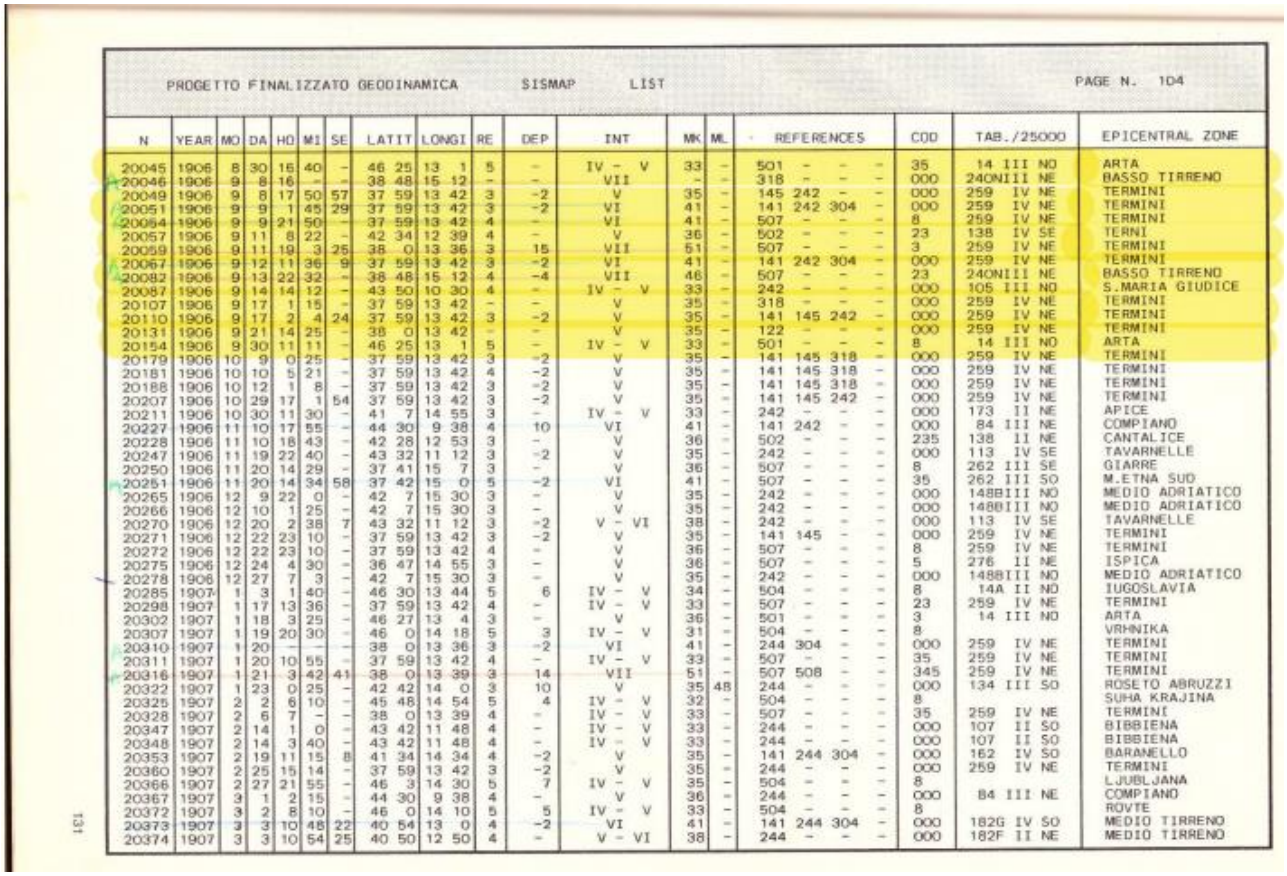
Results

42 degrees 45 arcminutes

42° 45’

04.08.1906 Full Moon 12h 59m; 11° 12' – Lunar eclipse

42° 45' N 11° 12' = Grosseto (Tuscany)



PROGETTO FINALIZZATO GEODINAMICA SISMAP LIST PAGE N. 104

N	YEAR	MO	DA	HO	MI	SE	LATIT	LONGI	RE	DEP	INT	MK	ML	REFERENCES	COD	TAB./25000	EPICENTRAL ZONE
20045	1906	8	30	16	40	-	46 25	13 1	5	-	IV - V	33	-	501 - - -	35	14 III NO	ARTA
20046	1906	9	8	16	-	-	38 48	15 12	-	-	VII	-	-	318 - - -	000	240NIII NE	BASSO TIRRENO
20049	1906	9	8	17	50	57	37 59	13 42	3	-2	V	35	-	145 242 - -	000	259 IV NE	TERMINI
20051	1906	9	9	1	45	29	37 59	13 42	3	-2	VI	41	-	141 242 304 -	000	259 IV NE	TERMINI
20064	1906	9	9	21	50	-	37 59	13 42	4	-	VI	41	-	507 - - -	8	259 IV NE	TERMINI
20057	1906	9	11	8	22	-	42 34	12 39	4	-	V	36	-	502 - - -	23	138 IV SE	TERNI
20059	1906	9	11	19	3	25	38 0	13 36	3	15	VII	51	-	507 - - -	3	259 IV NE	TERMINI
20067	1906	9	12	11	36	9	37 59	13 42	3	-2	VI	41	-	141 242 304 -	000	259 IV NE	TERMINI
20082	1906	9	13	22	32	-	38 48	15 12	4	-4	VII	46	-	507 - - -	23	240NIII NE	BASSO TIRRENO
20087	1906	9	14	14	12	-	43 50	10 30	4	-	IV - V	33	-	242 - - -	000	105 III NO	S.MARIA GIUDICE
20107	1906	9	17	1	15	-	37 59	13 42	-	-	V	35	-	318 - - -	000	259 IV NE	TERMINI
20110	1906	9	17	2	4	24	37 59	13 42	3	-2	V	35	-	141 145 242 -	000	259 IV NE	TERMINI
20131	1906	9	21	14	25	-	38 0	13 42	-	-	V	35	-	122 - - -	000	259 IV NE	TERMINI
20154	1906	9	30	11	11	-	46 25	13 1	5	-	IV - V	33	-	501 - - -	8	14 III NO	ARTA
20179	1906	10	9	0	25	-	37 59	13 42	3	-2	V	35	-	141 145 318 -	000	259 IV NE	TERMINI
20181	1906	10	10	5	21	-	37 59	13 42	4	-2	V	35	-	141 145 318 -	000	259 IV NE	TERMINI
20188	1906	10	12	1	8	-	37 59	13 42	3	-2	V	35	-	141 145 318 -	000	259 IV NE	TERMINI
20207	1906	10	29	17	1	54	37 59	13 42	3	-2	V	35	-	141 145 242 -	000	259 IV NE	TERMINI
20211	1906	10	30	11	30	-	41 7	14 55	3	-	IV - V	33	-	242 - - -	000	173 II NE	APICE
20227	1906	11	10	17	55	-	44 30	9 38	4	10	VI	41	-	141 242 - -	000	84 III NE	COMPIANO
20228	1906	11	10	18	43	-	42 28	12 53	3	-	V	36	-	502 - - -	235	138 II NE	CANTALICE
20247	1906	11	19	22	40	-	43 32	11 12	3	-2	V	35	-	242 - - -	000	113 IV SE	TAVARNELLE
20250	1906	11	20	14	29	-	37 41	15 7	3	-	V	36	-	507 - - -	8	262 III SE	GIARRE
20251	1906	11	20	14	34	58	37 42	15 0	5	-2	VI	41	-	507 - - -	35	262 III SO	M.ETNA SUD
20265	1906	12	9	22	0	-	42 7	15 30	3	-	V	35	-	242 - - -	000	148BIII NO	MEDIO ADRIATICO
20266	1906	12	10	1	25	-	42 7	15 30	3	-	V	35	-	242 - - -	000	148BIII NO	MEDIO ADRIATICO
20270	1906	12	20	2	38	7	43 32	11 12	3	-2	V - VI	38	-	242 - - -	000	113 IV SE	TAVARNELLE
20271	1906	12	22	23	10	-	37 59	13 42	3	-2	V	35	-	141 145 - -	000	259 IV NE	TERMINI
20272	1906	12	22	23	10	-	37 59	13 42	4	-	V	36	-	507 - - -	8	259 IV NE	TERMINI
20275	1906	12	24	4	30	-	36 47	14 55	3	-	V	36	-	507 - - -	5	276 II NE	ISPICA
20278	1906	12	27	7	3	-	42 7	15 30	3	-	V	35	-	242 - - -	000	148BIII NO	MEDIO ADRIATICO
20285	1907	1	3	1	40	-	46 30	13 44	5	6	IV - V	34	-	504 - - -	8	14A II NO	IUGOSLAVIA
20298	1907	1	17	13	36	-	37 59	13 42	4	-	IV - V	33	-	507 - - -	23	259 IV NE	TERMINI
20302	1907	1	18	3	25	-	46 27	13 4	3	-	V	36	-	501 - - -	3	14 III NO	ARTA
20307	1907	1	19	20	30	-	46 0	14 18	5	3	IV - V	31	-	504 - - -	8		VRHNIKA
20310	1907	1	20	-	-	-	38 0	13 36	3	-2	VI	41	-	244 304 - -	000	259 IV NE	TERMINI
20311	1907	1	20	10	55	-	37 59	13 42	4	-	IV - V	33	-	507 - - -	35	259 IV NE	TERMINI
20316	1907	1	21	3	42	41	38 0	13 39	3	14	VII	51	-	507 508 - -	345	259 IV NE	TERMINI
20322	1907	1	23	0	25	-	42 42	14 0	3	10	V	35	48	244 - - -	000	134 III SO	ROSETO ABRUZZI
20325	1907	2	2	6	10	-	45 48	14 54	5	4	IV - V	32	-	504 - - -	8		SUHA KRAJINA
20328	1907	2	6	7	-	-	38 0	13 39	4	-	IV - V	33	-	507 - - -	35	259 IV NE	TERMINI
20347	1907	2	14	1	0	-	43 42	11 48	4	-	IV - V	33	-	244 - - -	000	107 II SO	BIBBIENA
20348	1907	2	14	3	40	-	43 42	11 48	4	-	IV - V	33	-	244 - - -	000	107 II SO	BIBBIENA
20353	1907	2	19	11	15	8	41 34	14 34	4	-2	V	35	-	141 244 304 -	000	162 IV SO	BARANELLO
20360	1907	2	25	15	14	-	37 59	13 42	3	-2	V	35	-	244 - - -	000	259 IV NE	TERMINI
20366	1907	2	27	21	55	-	46 3	14 30	5	7	IV - V	35	-	504 - - -	8		LJUBLJANA
20367	1907	3	1	2	15	-	44 30	9 38	4	-	V	36	-	244 - - -	000	84 III NE	COMPIANO
20372	1907	3	2	8	10	-	46 0	14 10	5	5	IV - V	33	-	504 - - -	8		ROVTE
20373	1907	3	3	10	48	22	40 54	13 0	4	-2	VI	41	-	141 244 304 -	000	182G IV SO	MEDIO TIRRENO
20374	1907	3	3	10	54	25	40 50	12 50	4	-	V - VI	38	-	244 - - -	000	182F II NE	MEDIO TIRRENO

30.8.1906 Arta (Province of Udine, Friuli-Venezia Giulia)

2.09.1906 Full Moon 23h 36m; 9° 33'

08.09.1906 Lower Tyrrhenian Sea (Sea of the Aeolian Islands)

09.09.1906 Termini (Province of Palermo, Sicily)

11.09.1906 Terni (Province of Terni, Umbria)

11/12.09.1906 Termini (Province of Palermo, Sicily)

13.09.1906 Lower Tyrrhenian Sea (Sea of the Aeolian Islands)

10/11.09.1906 Last quarter moon 12° 49' – 24° 42'

14.09.1906 S. Maria del Giudice (Prov. Lucca, Toscana)

17-17-21.09.1906 Termini (Province of Palermo, Sicily)

18.09.1906 New Moon 12h 33m – 24° 40'

09.30.1906 Arta (Province of Udine, Friuli-Venezia Giulia)

02.10.1906 Full Moon 12h 48m 8° 24'

09.10.1906 Termini (Province of Palermo, Sicily)

10.10.1906 Last quarter moon 14° 35'

Fault path:

Veneto – Lombardy - Liguria - Emilia-Romagna – Friuli Venezia-Giulia – Aeolian Sea/Sicily – Umbria – Sicily/Aeolian Sea – Tuscany – Sicily – Friuli Venezia-Giulia – Sicily

2.09.1906 Full Moon 23h 36m; 9° 33'

10-11.09.1906 Last quarter moon 12° 49' – 24° 42'

18.09.1906 New Moon 12h 33m – 24° 40'

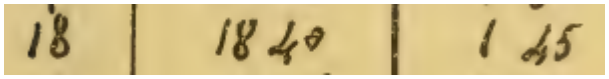
02.10.1906 Full Moon 12h 48m 8° 24'

10.10.1906 Last quarter moon 14° 35'

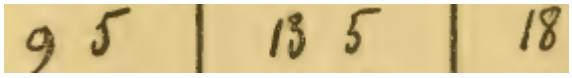
Tides Venice

September

a b a b



a b



a b

(2h 20m)

Input interpretation

2 hours 20 minutes

Results

2.333 hours

140 minutes

Unit conversion

8400 seconds

8400 seconds = 2.333333333333°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

2.518×10^9 km (kilometers)

2.518×10^{12} meters

17 au (astronomical units)

1.565 billion miles

Frequency ν from $\nu = 1/T$:

1.2×10^{-4} Hz (hertz)

(7h 5m)

Input interpretation

7 hours 5 minutes

Results

425 minutes

7.083 hours

Unit conversions

25 500 seconds

25500 seconds = 7.083333333333°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

7.645×10^9 km (kilometers)

7.645×10^{12} meters

51 au (astronomical units)

4.75 billion miles

Frequency ν from $\nu = 1/T$:

3.9×10^{-5} Hz (hertz)

(14h 40m)

Input interpretation

14 hours 40 minutes

Results

14.67 hours

880 minutes

Unit conversions

52 800 seconds

52800 seconds = 14.66666666667°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.583×10^{10} km (kilometers)

1.583×10^{13} meters

106 au (astronomical units)

9.836 billion miles

Frequency ν from $\nu = 1/T$:

1.9×10^{-5} Hz (hertz)

(22h 30m)

Input interpretation

22 hours 30 minutes

Results

22.5 hours

1350 minutes

Unit conversions

81 000 seconds

81000 seconds = 22.5°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

2.428×10^{10} km (kilometers)

2.428×10^{13} meters

162 au (astronomical units)

15.09 billion miles

Frequency ν from $\nu = 1/T$:

1.2×10^{-5} Hz (hertz)

(18h 40m)

Input interpretation

18 hours 40 minutes

Results

18.67 hours

1120 minutes

Unit conversions

67 200 seconds

67200 seconds = 18.66666666667°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

2.015×10^{10} km (kilometers)

2.015×10^{13} meters

135 au (astronomical units)

12.52 billion miles

Frequency ν from $\nu = 1/T$:

1.5×10^{-5} Hz (hertz)

(1h 45m)

Input interpretation

1 hour 45 minutes

Results

1.75 hours

105 minutes

Unit conversion

6300 seconds

6300 seconds = 1.75°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.889×10^9 km (kilometers)

1.889×10^{12} meters

13 au (astronomical units)

1.174 billion miles

Frequency ν from $\nu = 1/T$:

1.6×10^{-4} Hz (hertz)

(9h 5m)

Input interpretation

9 hours 5 minutes

Results

545 minutes

9.083 hours

Unit conversions

32 700 seconds

32700 seconds = 9.083333333333°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

9.803×10^9 km (kilometers)

9.803×10^{12} meters

66 au (astronomical units)

6.091 billion miles

Frequency ν from $\nu = 1/T$:

3.1×10^{-5} Hz (hertz)

(13h 5m)

Input interpretation

13 hours 5 minutes

Results

785 minutes

13.08 hours

Unit conversions

47 100 seconds

47100 seconds = 13.08333333333°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.412×10^{10} km (kilometers)

1.412×10^{13} meters

94 au (astronomical units)

8.774 billion miles

Frequency ν from $\nu = 1/T$:

2.1×10^{-5} Hz (hertz)

(-2.333333333333°+7.083333333333°-14.66666666667°+22.5°+18.66666666667°-1.75°-9.083333333333°+13.08333333333°)

Input interpretation

−2.333333333333° (degrees) + 7.083333333333° (degrees) −
14.66666666667° (degrees) + 22.5° (degrees) + 18.66666666667° (degrees) −
1.75° (degrees) − 9.083333333333° (degrees) + 13.08333333333° (degrees)

Result

33.5° (degrees)

33.5°

Unit conversions

584.7 mrad (milliradians)

0.5847 radians

---

33 degrees 30 arcminutes

33° 30’

October

(4h 25m)

Input interpretation

4 hours 25 minutes

Results

4.417 hours

265 minutes

Unit conversions

15 900 seconds

15900 seconds = 4.416666666667°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

4.767×10^9 km (kilometers)

4.767×10^{12} meters

32 au (astronomical units)

2.962 billion miles

Frequency ν from $\nu = 1/T$:

6.3×10^{-5} Hz (hertz)

(7h 15m)

Input interpretation

7 hours 15 minutes

Results

7.25 hours

435 minutes

Unit conversions

26 100 seconds

26100 seconds = 7.25°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

7.825×10^9 km (kilometers)

7.825×10^{12} meters

52 au (astronomical units)

4.862 billion miles

Frequency ν from $\nu = 1/T$:

3.8×10^{-5} Hz (hertz)

(14h 20m)

Input interpretation

14 hours 20 minutes

Results

14.33 hours

860 minutes

Unit conversions

51 600 seconds

51600 seconds = 14.33333333333°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.547×10^{10} km (kilometers)

1.547×10^{13} meters

103 au (astronomical units)

9.612 billion miles

Frequency ν from $\nu = 1/T$:

1.9×10^{-5} Hz (hertz)

(23h 00m)

Input interpretation

23 hours

Results

23 hours

1380 minutes

Unit conversions

82 800 seconds

82800 seconds = 23°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

2.482×10^{10} km (kilometers)

2.482×10^{13} meters

166 au (astronomical units)

15.42 billion miles

Frequency ν from $\nu = 1/T$:

1.2×10^{-5} Hz (hertz)

From the algebraic sum of the above results:

(-4.416666666667° - 7.25° + 14.33333333333° + 23°)

Input interpretation

−4.416666666667° (degrees) − 7.25° (degrees) +
14.33333333333° (degrees) + 23° (degrees)

Result

25.667° (degrees)

25.667°

Ischia tides

September 2

(24h 55m)

(1h 00m) - 300 seconds

Input interpretation

1 hour – 300 seconds

Results

55 minutes

3300 seconds

3300 seconds = 0.9166666666667°

(13h 25m)

Input interpretation

13 hours 25 minutes

Results

13.42 hours

805 minutes

Unit conversions

48 300 seconds

48300 seconds = 13.41666666667°

September 18

(3h 55m)

Input interpretation

3 hours 55 minutes

Results

3.917 hours

235 minutes

Unit conversions

14 100 seconds

14100 seconds = 3.916666666667°

(16h 35m)

Input interpretation

16 hours 35 minutes

Results

16.58 hours

995 minutes

Unit conversions

59 700 seconds

59700 seconds = 16.58333333333°

(16.58333333333° + 3.916666666667°) - (13.41666666667° + 0.916666666667°)

Input interpretation

(16.58333333333° (degrees) + 3.916666666667° (degrees)) –
(13.41666666667° (degrees) + 0.9166666666667° (degrees))

Result

6.1666666667° (degrees)

6.16666666667°

Unit conversions

107.62863721 mrad (milliradians)

0.10762863721 radians

---

6 degrees 10 arcminutes

(33° 30’ + 6° 10’)

Input interpretation

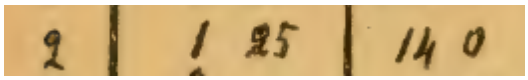
33 degrees 30 arcminutes + 6 degrees 10 arcminutes

Results

39 degrees 40 arcminutes

39° 40’ N 12° 49’ E (Mar Tirreno meridionale)

October



(1h 25m)

Input interpretation

1 hour 25 minutes

Results

1.417 hours

85 minutes

Unit conversion

5100 seconds

5100 seconds = 1.416666666667°

(14h 00m)

Input interpretation

14 hours

Results

14 hours

840 minutes

Unit conversions

50 400 seconds

50400 seconds = 14°

From the sum of the above results, we obtain:

(14° - 1.416666666667°)

Input interpretation

14° (degrees) – 1.416666666667° (degrees)

Result

12.583333333333° (degrees)

12.58333333°

Unit conversions

219.62059754261 mrad (milliradians)

0.21962059754261 radians

---

12 degrees 34 arcminutes 59.999999999 arcseconds

From the sum of the two previous results:

(25.667° + 12.583333333333°)

Input interpretation

25.667° (degrees) + 12.583333333333° (degrees)

Result

38.25° (degrees)

38.25°

Unit conversions

667.6 mrad (milliradians)

0.6676 radians

---

38 degrees 15 arcminutes

38° 15’ N 14° 35’ E (Mar Tirreno meridionale – tra Sicilia ed Isole Eolie)

Thus, we have obtained:

39° 40’ N 12° 49’ E (Southern Tyrrhenian Sea) (September)

38° 15’ N 14° 35’ E (Southern Tyrrhenian Sea – between Sicily and the Aeolian Islands) (October)

02.08.1906 San Pietro (Prov. Verona, Veneto) 02.08.1906 Asola (Prov. Mantova, Lombardia) 11.08.1906 Ceriana (Prov. Imperia, Liguria) 25.08.1906 Noceto (Prov. Parma, Emila-Romagna)

30.08.1906 Arta (Province of Udine, Friuli-Venezia Giulia)

09.08.1906 Lower Tyrrhenian Sea (Sea of the Aeolian Islands)

09.09.1906 Termini (Province of Palermo, Sicily)

11.09.1906 Terni (Province of Terni, Umbria)

11/12.09.1906 Termini (Province of Palermo, Sicily)

13.09.1906 Lower Tyrrhenian Sea (Sea of the Aeolian Islands)

From

Radiant Etna – Adriatic (Venice-Trieste)

Observations and conclusions

Electromagnetic phenomena accompany periods of earthquakes, and which at that time often take the place of telluric motions. In addition to this, they predominate every year during one or two months which chooses between March and May or, at the latest, enters June and July. **The activity of the sun is the center of electromagnetic phenomena** (Michele Stefano De Rossi – "Meteorologia Endogena")

Recall that tidal force (generally used in the plural, tidal forces or tidal forces, and also with the expression tidal effects) is a secondary effect of the **force of gravity**. Tidal effects from different bodies can add up, as in the case of the alignment between the Moon and the Sun which gives rise to intense syzygial tides.

The undoubted correlation that Prof. De Rossi felt between the Corleone earthquakes and those of Monte Baldo last year moved me to pay special attention to the latter as well. Rummaging through the scientific yearbooks, I found the precise dates of the strongest earthquakes felt in 1866 on the slopes of Monte Baldo, namely: 13 June, 11 August and 7-8 November, which correspond to the new moons; in 1870 seismic activity reawakened there, but I don't know the dates; in 1876 the first strong shock occurred on April 23, that is, on the eve of the new moon; with the perigee (which took place on the 26th) the shocks prepared by the new moon continued until the 29th; then the frequency decreased until May 4th and it already seemed to have left those populations in peace; except that the next coincidence of the new moon with the perigee and with a strong northern declination (in which position, as I already said, one of the two passages to the meridian is an energetic occasion for an earthquake) provided me with such a clue of awakening, probably on a greater extent of land , that here I prepared myself for careful surveillance, so as not to miss the most important phases of the phenomenon, when this happened. I mentioned this probability to Prof. Don Timoteo Bertelli of Florence in my letter of May 1st and to Prof. Goiran of Verona in a letter of the same 12th. The critical day otherwise passed peacefully in Trieste; not so in Monte Baldo, where the tremors resumed on the 22nd and continued on the 23rd, to be repeated on the 29th; at the same time in Corleone the activity, which had seemed almost extinguished since the 10th, was reawakened with a shock on the 20th, one on the 21st, four on the 24th and with great energy on the 25th. On May 22nd, the eve of the new moon, the very strong earthquake also occurred of Spoleto and at the time of the new moon in question there was, it can be said, no region of the Apennines in which seismic activity did not manifest itself with greater or lesser force, as can be seen from the bulletin.

In Monte Baldo there was a truce during June; in July the tremors resumed the day after the full moon and continued thereafter without interruption; in the following months tremors were noted on August 7th, September 5th, October 9th and November 4th, that is, almost always one or two days after the full moon. It is remarkable that on May 22nd and 23rd, while the rest of Italy was shaking, there was a truce in Corleone and then an immediate awakening, and the truce that occurred in the new moons following Monte Baldo in the face of energy is equally significant. manifested itself at the same time as Corleone, where the endogenous forces were transported by geological-mechanical effects, which it is not my task to erudite. In 1870, as far as I can remember, the seismic period of Monte Baldo put an end to that of Monte Nevoso (Julian Alps). This began on February 28th with a strong tremor at 12.20 pm; the next day the shocks were repeated and so also on the day of the new moon, March 2, and the following; after a fifteen-day truce a shock was felt at the full moon; then there were other tremors, the dates of which I could not know; those that came to my attention, and were the strongest, occurred on April 28th (the eve of the new moon), on May 10th, on May 15th (full moon), on June 2nd (near the new moon) and several between the 13th and the 19th. June (full moon period). Then the activity died down there and arose in Monte Baldo. Monte Nevoso was frequently subject to earthquakes; in relatively recent times there was a long period from November 1750 to May 1753; and in 1838 the populations remained in suspense for three months. That local area includes the city of Rijeka; and even in the small earthquakes, which occur here from time to time, I have observed a decided prevalence of syzygies. From this we see that some seismic periods, although limited within very narrow boundaries, can be the effect of a large telluric cause. I took the Corleone period into special consideration, because this is one of the few whose phases have been carefully studied and from which there is a sufficiently large number of shocks to draw positive consequences. There was another seismic period of recent memory and well studied, that of Belluno; the existing relationship between it and the lunar positions has no need of my demonstrations, because the illustrious Falb proved it since he predicted, based on his theories, the return of the phenomenon even during the course of the period itself.

Perhaps all the seismic phenomena that occur in Italy have as their cause, if not direct, at least determining, the action of the stars, but while on the one hand the lack of sufficient observations does not allow very extensive studies, on the other hand the translocation, which often happens, seismic centers distract the attention of investigators so as not to allow them to glimpse the effects of a great common cause in isolated phenomena.

It is desirable that the invitation made repeatedly by Prof. Cav. De Rossi, in order to obtain the greatest possible number of reports on seismic phenomena, must be listened to by those who have the progress of science at heart and that no one abstains from communicating even crude observations of such phenomena, the memory of which without this could be lost to the detriment of science. (**DELL' ATTRAZIONE LUNI- SOLARE IN RELAZIONE COI FENOMENI MAREO – SISMICI** - STUDI DIMOSTRATIVI DI GIULIO GRABLOVITZ – 1877)

In conclusion:

While **the activity of the sun is the center of electromagnetic phenomena,** the tidal force, hence the luni-solar attraction, is a secondary effect of the **force of gravity**. The **aurora borealis**, for example, is a phenomenon visually characterized by luminous bands that take on a wide range of shapes and colours, rapidly changing in time and space, usually red-green-blue in colour, called auroral arcs, caused from the interaction of charged particles (protons and electrons) of solar origin (solar wind) with the terrestrial ionosphere (atmosphere between 100-500 km): these particles excite the atoms of the atmosphere which, subsequently de-energizing, emit light of various lengths 'wave. Solar activity is a source of emission of **electromagnetic waves** and **electrically charged particles**, the luni-solar attraction, is a secondary effect of the **force of gravity**. It is therefore possible to hypothesize a connection, albeit indirect, between these phenomena and "**gravitational waves**" which, among other things, travel at a speed equal to c (speed of light), as well as **electromagnetic waves**. Thus, there is a purely mathematical connection between seismic waves and gravitational waves.

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

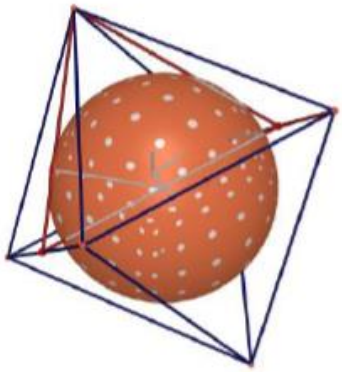


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.141939571526584308924330732196162632677513386811659044682541739 3

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$
$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

$4096 = 64^2$, (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$).

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.61805\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^8\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^8\right)^k}{k!}\right)\quad\text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$
$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi e^0 \approx 3.1416$ (real, principal root)

$\pi e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1\sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003$ (real, principal root)

$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003$ (real root)

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\,\pi\left\lfloor\frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{8}{\pi^2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} =$$

$$\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} =$$

$$\sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

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$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\mathrm{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13

…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\Big/\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}\left(C\times \mathrm{R}\times 2.33\cdot 10^{-13}\right)}}\cong 1.61803398\ldots=\frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.618035912348264235440174408834709854254527350840173356306481810 7

…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\, x^2\, y\, z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$ is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.6018401361\times 10^{-24}\right)}}$$

1.618032997307532491506757016629746746422577260892967140791939590 3
…

1.6180329973075…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.4525642121\times 10^{-24}\right)}}$$

Result

1.644932352102092130483898983704151168876621841655166877914166033 8
…

1.64493235210209213…. ≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

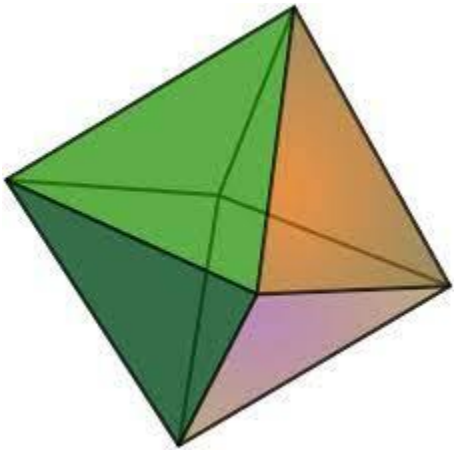
Result

3.14159225731469939939950039231605796469731171781644423955790024797

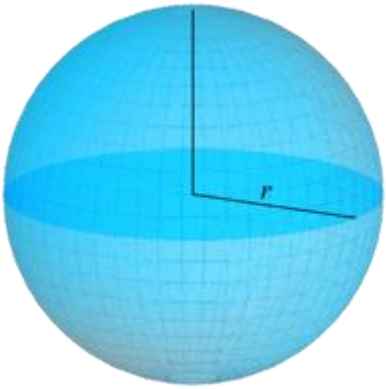
…

3.14159225731469…. ≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find *a*, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

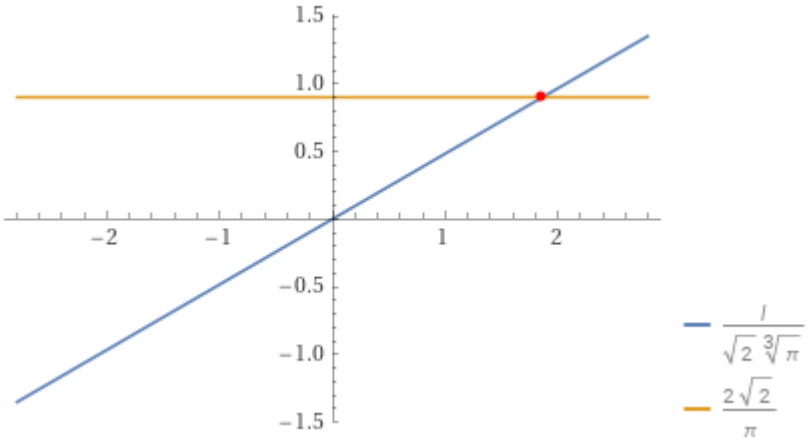
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,3}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi =$$
$$\left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not}\ (z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

1.64381856858…. $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\wedge(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\wedge(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\wedge(1/15)\right)$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)}\quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

$-5.010882647757...$

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\,\sqrt{6}}\right)^2\right\} = 0$$

for $b = -\frac{226\,802\,245}{18\,480\,874}$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

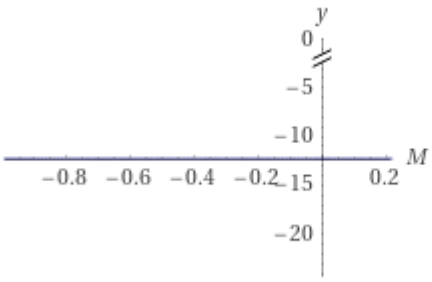
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

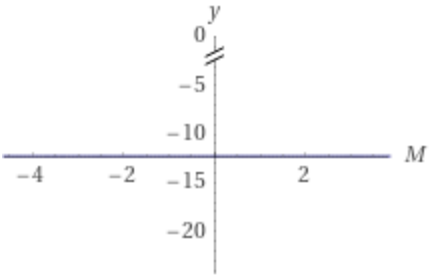
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V = \frac{1}{3}(0.0814845\,b + 1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

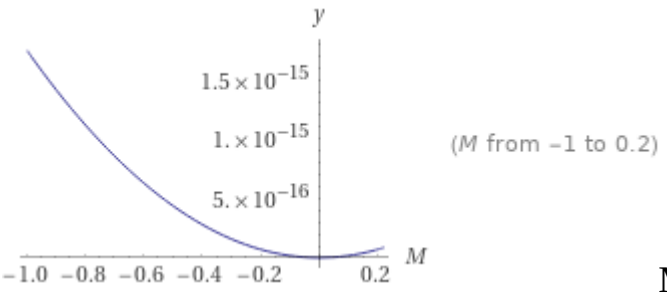
Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\,M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

Result:

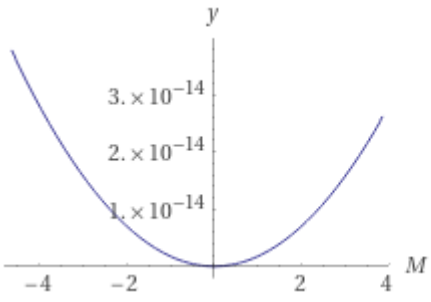
0

Plots: **(possible mathematical connection with an open string)**



M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O(M^{62194})$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{1}{3}M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2\left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^{-16}

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times 10^{-17}$

7.021621519159*10^{-17}

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

1.57986484181*10^-14

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 2^2 + 6.58545 \times 10^{-10}\sqrt{2^4}\right)}{2^2} + 1\right)^2 \times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

7.021621519*10^-15

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_{0}}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\,\hat{}\,(1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

$5.729475 * 10^{-35}$ Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

$1.820306 * 10^{61}$ V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

$5.975498*10^{-8}$ V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

$1.042940*10^{27}$ V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

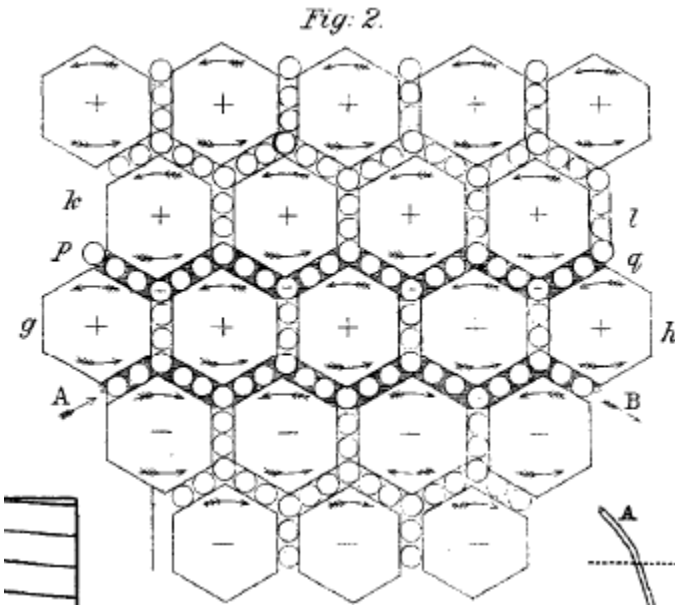
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

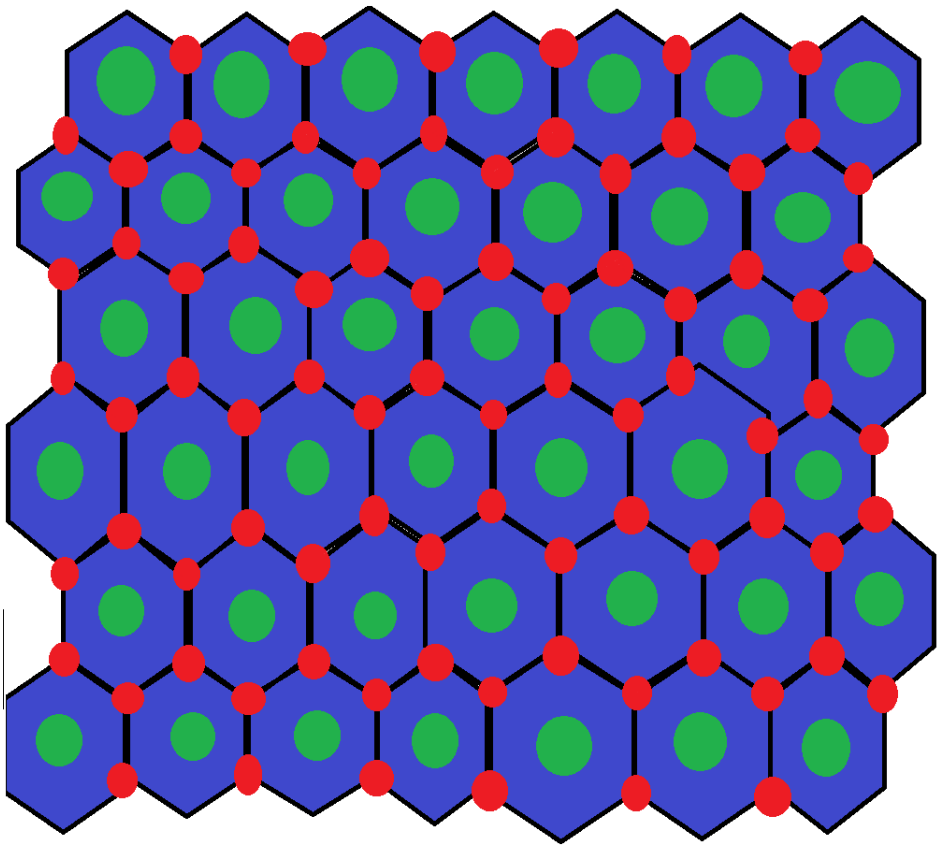
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On some equations concerning the seismology and the calculation relating to the tides and solar eclipses. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory IX

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper (part IX), we analyze some equations concerning the seismology and the calculation relating to the tides and solar eclipses. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory

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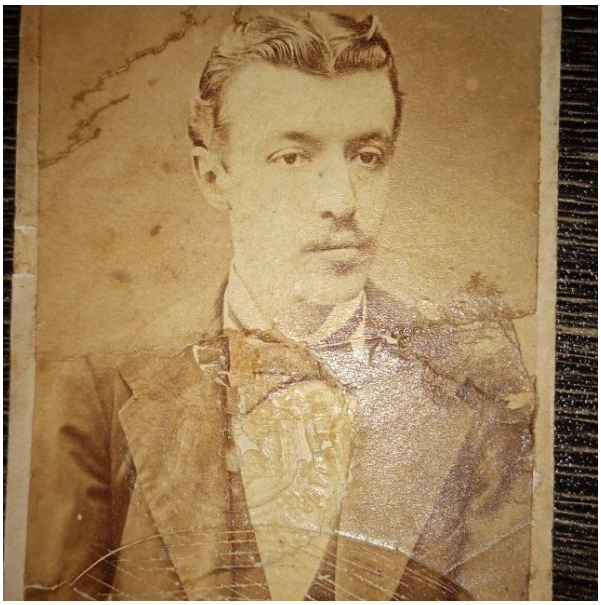
Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

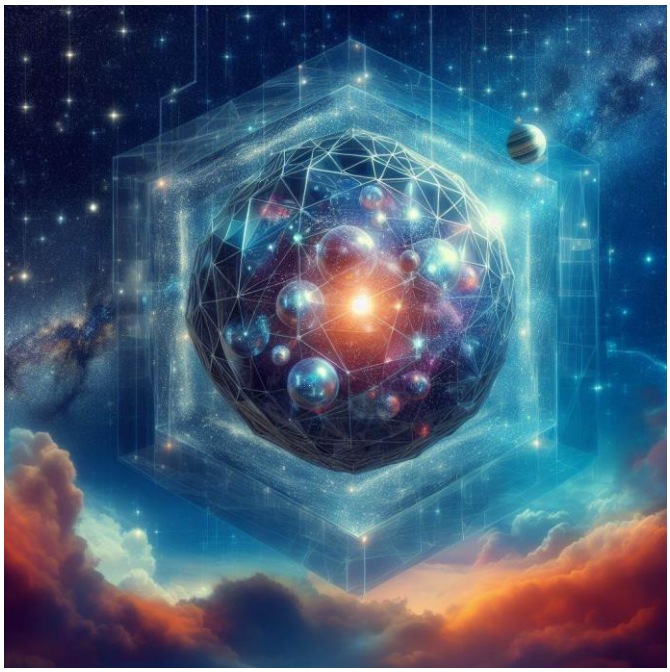
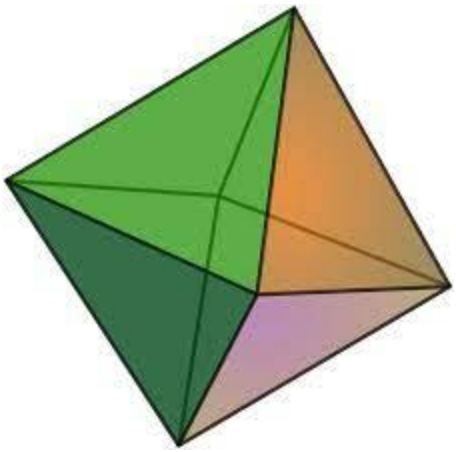
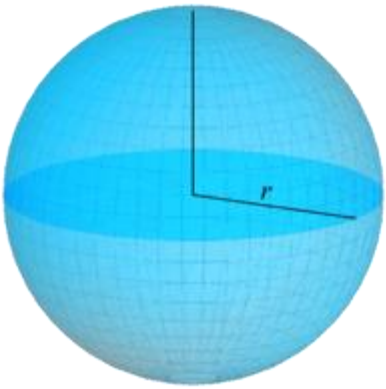


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\pi x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$l = 0, \quad x = 0$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt{2}\ \sqrt[3]{\pi}\right) = \log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\ \pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

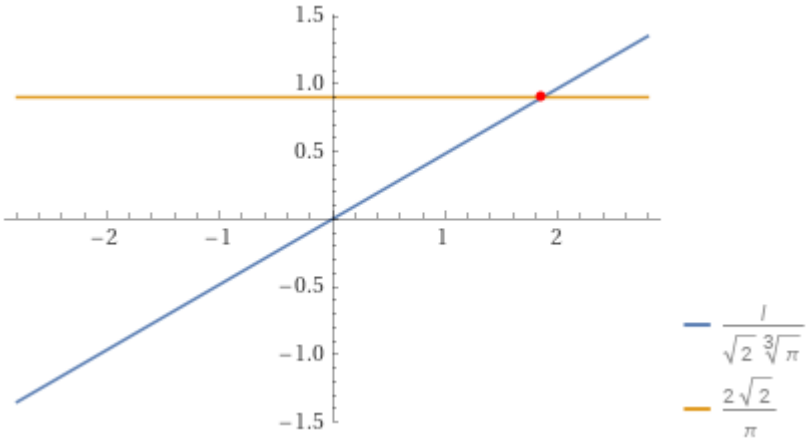
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

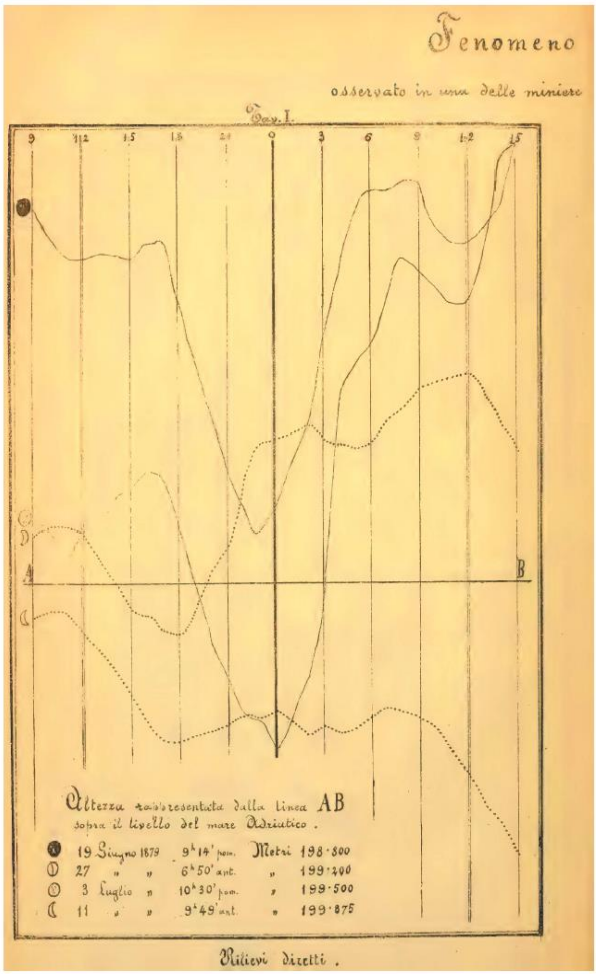
Plot

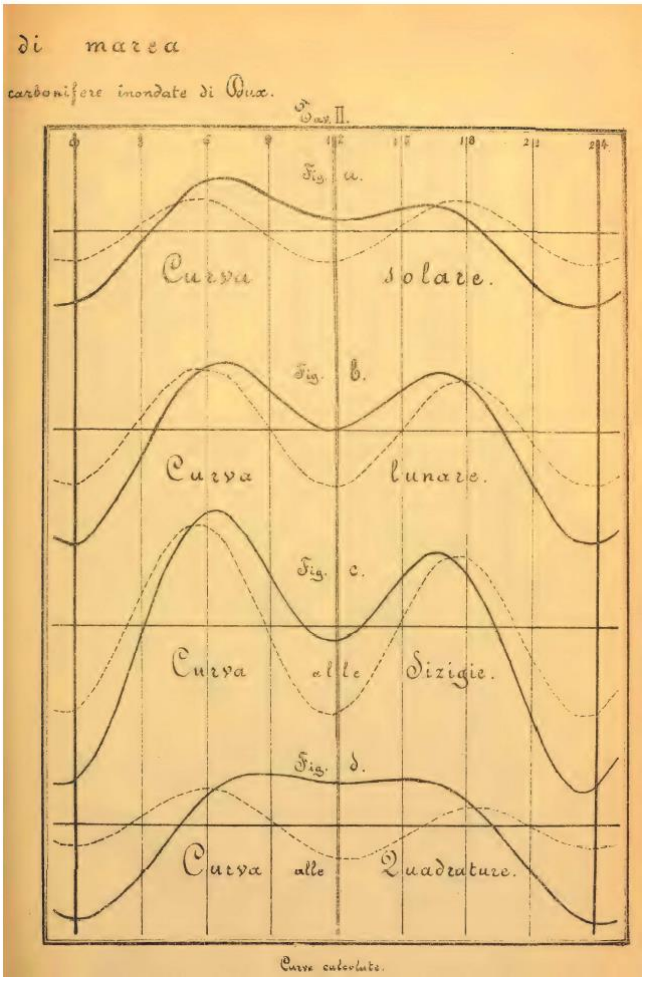


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

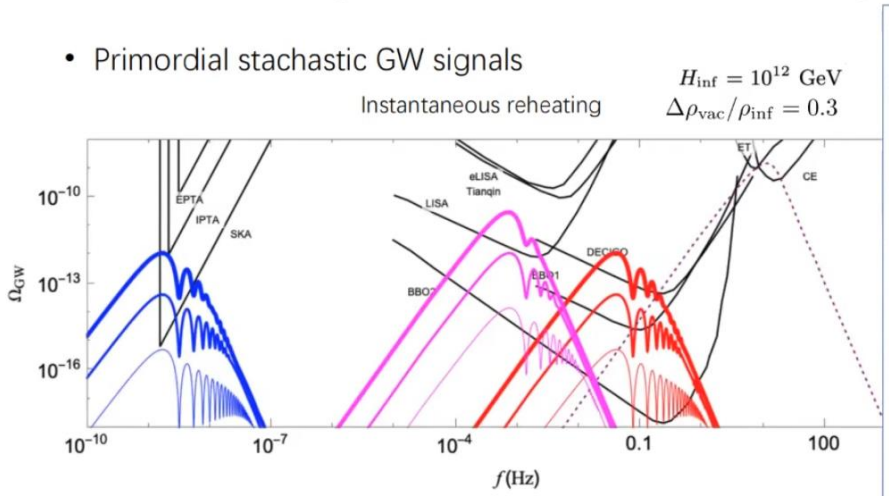

di marea
carbonifere inondate di Pux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

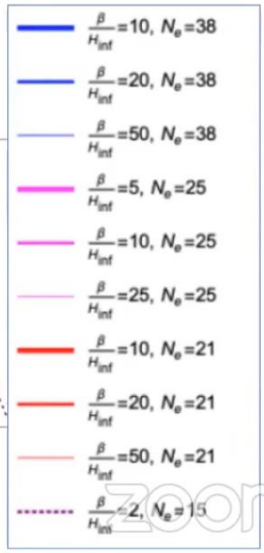
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

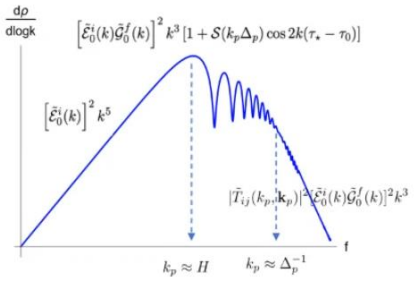
Comparison between primary GW and secondary GW

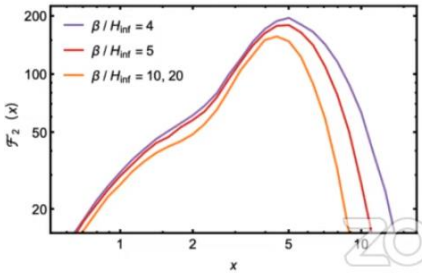
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





From

GIULIO GRABLOVITZ. — Fenomeni vesuviani dell' aprile 1906 osservati da Ischia.

Perturbazione principale.

Principio a 0h31m 5s dell' 8 aprile 1906.
I Massimo 0 31 11 = mm. 0.048;
II » 0 31 52 = » 0.024;
Diminuzione 0 32; estinzione indefinibile, le perturbazioni continuando senza tregua come dalle indicazioni che seguono:

Da 0h39m a 0h45m; massimo = mm. 0.015;
» 1 20 » 1 30 » = » 0.015;
» 1 50 » 1 57 » = » 0.015; poi tregua relativa.
A 2h 5m 0s ripresa,
» 2 5 22 massimo = mm. 0.020;
» 2 9 25 » = » 0.031;
» 2 17 40 » = » 0.041;
» 2 35 0 » = » 0.046;

A 2h52m50 massimo = mm. 0.046;
» 2 56 — diminuzione; poi altra tregua relativa.
Da 3h15m a 3h20m massimo = mm. 0.026;
A 4h44m 5s mass. = mm. 0.031 ,
» 5 3 45 » = 0.038 ,
» 5 14 10 » = 0.010 ,
» 5 26 6 » = 0.013 ,
istantanei fra moti continui di 0.010
» » » » » 0.005

11 Aprile 1906.

Principio	Massimo	Fine	Ampiezza effettiva Grande Sent.	Ampiezza effettiva P. d'Ischia
0h 26m 47s	0h 27m 55s	0h 29m 18s	mm. 0.001	mm. 0.019
0 33 12	0 35 7	0 37 49	» 0.001	» 0.012
1 20 38	1 21 25	1 23 30	» 0.001	» 0.006
1 26 41	1 27 20	1 28 45	» 0.000	» 0.004
2 24 13	2 25 43	2 27 48	» 0.002	» 0.015
5 39 24	5 40 54	5 42 36	» 0.000	» 0.003 *
6 32 19	6 34 30	6 36 30	» 0.000	» 0.001
13 4 30	13 5 24	13 7 40	» 0.001	» 0.004
13 14 47	13 15 48	13 18 24	» 0.001	» 0.015

Da 20h15m a 21h0m parecchie piccolissime perturbazioni registrate al Porto d'Ischia e non alla Grande Sentinella.

14 Aprile 1906 da 5h17m43s a 5h25m48s registrazione di terremoto lontano.

18 » » da 8h8m8s a 8h9m20s perturbazione col massimo di mm. 0.010 alla Gr. Sent. e di 0.016 al Porto d'Ischia a 8h8m36s.

15 Aprile 1906	**Ultimo quarto**		20°04’

20° 04’

(5h 17m 43s)

Input interpretation

5 hours 17 minutes 43 seconds

Results

5.295 hours

19063 seconds

19063 seconds = 5.295277777778°

(8h 8m 36s)

Input interpretation

8 hours 8 minutes 36 seconds

Results

8.143 hours

29316 seconds

29316 seconds = 8.143333°

488.6 minutes

April 7 1906, 16:53 Carinthia, Eisenkappel earthquake

Date	1906-04-07 16:53
Lat, Lon	46.490, 14.590
Io	5-6
Mw	4.40 ± 0.46

9 Aprile 1906	**LUNA PIENA** alle 06:12		18°28’

(06h 12m)

Input interpretation

6 hours 12 minutes

Results

6.2 hours

372 minutes

Unit conversions

22 320 seconds

22320 seconds = 6.2°

23 Aprile 1906	**LUNA NUOVA** alle 16:06		2°34’

18.47 (tram.)

(16h 6m)

Input interpretation

16 hours 6 minutes

Results

966 minutes

16.1 hours

Unit conversions

57 960 seconds

57960 seconds = 16.1°

(16.1°)

Input interpretation

16.1° (degrees)

Unit conversions

281 mrad (milliradians)

0.281 radians

---

16 degrees 6 arcminutes

16° 6’

15 Aprile 1906	**Ultimo quarto**		20°04’

(18h 47m)

Input interpretation

18 hours 47 minutes

Results

18.78 hours

1127 minutes

Unit conversions

67 620 seconds

67620 seconds = 18.78333333333°

20° 04’ + 18.7833333°

Input interpretation

20 degrees 4 arcminutes + 18.7833333° (degrees)

Results

38 degrees 51 arcminutes

38° 51’

38° 51’ N 16° 6’ E (Mar Tirreno – prov. Catanzaro)

Data	1906-04-21 06:35	
	Lat, Lon	43.446, 11.137
	MDP set	► 45 MDPs Imax 6-7 MCS Castelli et al., 1996
	Io	5-6
	Mw	4.30 ± 0.22

Earthquake (Toscana-Valdelsa – prov.Siena-Firenze)

Data	1906-04-22 23:12	
	Lat, Lon	37.955, 14.165
	MDP set	► 24 MDPs Imax 5-6 MCS Molin et al., 2008
	Io	5
	Mw	4.18 ± 0.33

Earthquake (Sicilia Settentrionale – Madonie-Cefalù)

We remember that April 18, 1906 is the date of the violent earthquake that hit the city of San Francisco (United States). The earthquake was of magnitude 8.3, its epicenter according to experts was located on the coast of Daly City south-east of the city of San Francisco.

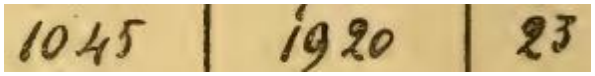
Date 18 April 1906; Time 5:12 ; Richter magnitude 8.3 ; Moment magnitude 7.8

Daly City Epicenter 37°41′27″N 122°27′57″W

April 22 1906, 23:12 Monti Madonie earthquake

Date	1906-04-22 23:12
Lat, Lon	37.955, 14.165
MDP set	
Io	5
Mw	4.18 ± 0.33

Tides Venice



Low high date

(10h 45m)

Input interpretation

10 hours 45 minutes

Results

10.75 hours

645 minutes

Unit conversions

38 700 seconds

38700 seconds = 10.75°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.16×10^{10} km (kilometers)

1.16×10^{13} meters

78 au (astronomical units)

7.209 billion miles

Frequency ν from $\nu = 1/T$:

2.6×10^{-5} Hz (hertz)

(19h 20m)

Input interpretation

19 hours 20 minutes

Results

19.33 hours

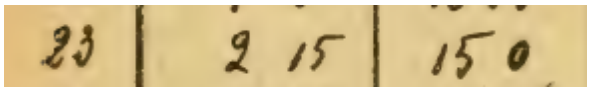
1160 minutes

Unit conversions

69 600 seconds

69600 seconds = 19.333°

Tides Ischia



date high high

(2h 15m)

Input interpretation

2 hours 15 minutes

Results

2.25 hours

135 minutes

Unit conversion

8100 seconds

8100 seconds = 2.25°

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

2.428×10^9 km (kilometers)

2.428×10^{12} meters

16 au (astronomical units)

1.509 billion miles

Frequency ν from $\nu = 1/T$:

1.2×10^{-4} Hz (hertz)

(15h 00m)

Input interpretation

15 hours

Results

15 hours

900 minutes

Unit conversions

54 000 seconds

54000 seconds = 15°

From the above results, we obtain:

(10.75° + 19.33° + 2.25° + 15°- 2° 34')

Input interpretation

10.75° (degrees) + 19.33° (degrees) +
2.25° (degrees) + 15° (degrees) – 2 degrees 34 arcminutes

Results

44.8° (degrees)

Input interpretation

44.8° (degrees)

Unit conversions

781.9 mrad (milliradians)

0.7819 radians

44 degrees 48 arcminutes

44° 48’

From the previous result, we obtain also:

10.75°

Input interpretation

10.75° (degrees)

Unit conversions

187.62 mrad (milliradians)

0.18762 radians

---

10 degrees 45 arcminutes

10° 45’

44° 48’ N 10° 45’ E (Correggio – Reggio Emilia)

From Correggio – Reggio Emilia to Toscana-Valdelsa – prov.Siena-Firenze, are 191.4 Km

And also:

(10.75° + 19.33° + 2.25° + 15°+ 2° 34')

Input interpretation

10.75° (degrees) + 19.33° (degrees) +
2.25° (degrees) + 15° (degrees) + 2 degrees 34 arcminutes

Results

49 degrees 53.8 arcminutes

49.897° (degrees)

Input interpretation

49.897° (degrees)

Unit conversions

870.9 mrad (milliradians)

0.8709 radians

---

49 degrees 53 arcminutes 50 arcseconds

49° 53’ N 10° 45’ E

And again:

(10.75° + 19.33° - 2.25° + 15°+ 2° 34')

Input interpretation

10.75° (degrees) + 19.33° (degrees) –
2.25° (degrees) + 15° (degrees) + 2 degrees 34 arcminutes

Results

45 degrees 23.8 arcminutes

45.397° (degrees)

Input interpretation

45.397° (degrees)

792.3 mrad (milliradians)

0.7923 radians

---

45 degrees 23 arcminutes 50 arcseconds

45° 23’

From the mean between the above results, we obtain:

(49° 53 + 45° 23’)/2

Input interpretation

$\frac{1}{2}$ (49 degrees 53 arcminutes + 45 degrees 23 arcminutes)

Results

47 degrees 38 arcminutes

47° 38' N 10° 45' E Valeggio sul Mincio, Province of Verona

431-451 km away from Austria

Evidente è il fatto, che le ampiezze al Porto d'Ischia sono maggiori che alla Grande Sentinella e ciò fornisce la prova che il Porto d'Ischia è più vicino all'epicentro, tanto più che le perturbazioni minime non hanno lasciato tracce apprezzabili alla Grande Sentinella, mentre la sensibilità dei due apparecchi era la stessa come fu provato dai sismogrammi pressochè identici ottenuti in occasione del terremoto di S. Francisco del 18 aprile. Perciò la detta differenza d'ampiezza milita a favore della provenienza vesuviana.

Scindendo la detta serie di perturbazioni isolate in 3 gruppi, senza tener conto dei terremoti lontani, nè di quelli di cui mancò accidentalmente in una delle due stazioni il funzionamento, si ottiene il seguente quadro:

Periodo	Quantità dei dati	Somma delle ampiezze		Medie ampiezze		Rapporto
		Gr. S.	P. d'I.	Gr S.	P. d'I.	P : G
Giornate 8 e 9	10	0.313	0.518	0.0313	0.0518	1.78
Giornata del 10	15	0.153	0.556	0.0102	0.0371	3.63
Giornate 11 e 18	10	0.017	0.098	0.0017	0.0098	5.76
Somme =	35	0.483	1.172	0.0138	0.0335	2.43 = Medie

Ordinando infatti tutti i dati dell' ampiezza secondo l' intensità, quale risulta dalla somma dei dati corrispondenti delle due stazioni e raggruppandoli a 5 a 5, si ottiene il seguente risultato:

Gr. Sent.	P.° d' Ischia	Rapporto
46.4	75.8	1.63
25.5	59.4	2.38
11.6	39.0	3.36
7.0	29.4	4.20
4.4	17.2	3.91
1.8	10.2	5.67
0.4	3.4	8.50

Now:

(75.8 / 46.4) = 1,63362

(59.4 / 25.5) = 2,32941

(39 / 11.6) = 3,362068

(29.4 / 7) = 4.2

(17.2 / 4.4) = 3.909

(10.2 / 1.8) = 5.666

(3.4 / 0.4) = 8.5

(75.8 / 46.4)+(59.4 / 25.5)+(39 / 11.6)+(29.4 / 7)+(17.2 / 4.4)+(10.2 / 1.8)+(3.4 / 0.4)

Input

$$\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}$$

Result

29.600858995635871903620382322207880017210646013891449996926670354

…

29.6008589956…

From which:

7^2/(((75.8 / 46.4)+(59.4 / 25.5)+(39 / 11.6)+(29.4 / 7)+(17.2 / 4.4)+(10.2 / 1.8)+(3.4 / 0.4)))

Input

$$\frac{7^2}{\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}}$$

Result

1.655357366731289507297778052339050062412218622643189255286869 0869

…

1.655357366731…. result very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3$ = 1164.2696 i.e. 1.6557845...

Furthermore, we obtain also:

(47+11)(((75.8 / 46.4)+(59.4 / 25.5)+(39 / 11.6)+(29.4 / 7)+(17.2 / 4.4)+(10.2 / 1.8)+(3.4 / 0.4)))+4Pi-2/5

Input

$$(47+11)\left(\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}\right)+4\pi-\frac{2}{5}$$

Result

1729.02…

1729.02…

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternative representations

$$(47+11)\left(\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}\right)+4\,\pi-\frac{2}{5}=$$
$$720^\circ-\frac{2}{5}+58\left(\frac{3.4}{0.4}+\frac{10.2}{1.8}+\frac{17.2}{4.4}+\frac{29.4}{7}+\frac{39}{11.6}+\frac{59.4}{25.5}+\frac{75.8}{46.4}\right)$$

$$(47+11)\left(\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}\right)+4\,\pi-\frac{2}{5}=$$
$$-4\,i\log(-1)-\frac{2}{5}+58\left(\frac{3.4}{0.4}+\frac{10.2}{1.8}+\frac{17.2}{4.4}+\frac{29.4}{7}+\frac{39}{11.6}+\frac{59.4}{25.5}+\frac{75.8}{46.4}\right)$$

$$(47+11)\left(\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}\right)+4\,\pi-\frac{2}{5}=$$
$$4\cos^{-1}(-1)-\frac{2}{5}+58\left(\frac{3.4}{0.4}+\frac{10.2}{1.8}+\frac{17.2}{4.4}+\frac{29.4}{7}+\frac{39}{11.6}+\frac{59.4}{25.5}+\frac{75.8}{46.4}\right)$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$(47+11)\left(\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}\right)+4\,\pi-\frac{2}{5}=$$
$$1716.45+16\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}$$

$$(47+11)\left(\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}\right)+4\,\pi-\frac{2}{5}=$$
$$1708.45+8\sum_{k=1}^{\infty}\frac{2^k}{\binom{2\,k}{k}}$$

$$(47+11)\left(\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}\right)+4\pi-\frac{2}{5}=1716.45+4\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50\,k)}{\binom{3k}{k}}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$(47+11)\left(\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}\right)+4\pi-\frac{2}{5}=1716.45+8\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

$$(47+11)\left(\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}\right)+4\pi-\frac{2}{5}=1716.45+16\int_0^{1}\sqrt{1-t^2}\,dt$$

$$(47+11)\left(\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}\right)+4\pi-\frac{2}{5}=1716.45+8\int_0^{\infty}\frac{\sin(t)}{t}\,dt$$

(1/27(((47+11)(((75.8 / 46.4)+(59.4 / 25.5)+(39 / 11.6)+(29.4 / 7)+(17.2 / 4.4)+(10.2 / 1.8)+(3.4 / 0.4)))+4Pi-2/5)-1))^2

Input

$$\left(\frac{1}{27}\left(\left((47+11)\left(\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}\right)+4\pi-\frac{2}{5}\right)-1\right)\right)^2$$

Result

4096.08…

4096.08…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

((47+11)(((75.8 / 46.4)+(59.4 / 25.5)+(39 / 11.6)+(29.4 / 7)+(17.2 / 4.4)+(10.2 / 1.8)+(3.4 / 0.4)))+4Pi-2/5)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{(47+11)\left(\frac{75.8}{46.4}+\frac{59.4}{25.5}+\frac{39}{11.6}+\frac{29.4}{7}+\frac{17.2}{4.4}+\frac{10.2}{1.8}+\frac{3.4}{0.4}\right)+4\pi-\frac{2}{5}}+C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.64493905043192471729814940656152458437200431685168958570151708 39

…

1.6449390504319…. ≈ $\zeta(2) = \pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

From

Umberto Forti – **Trigonometria**

Dati a = m. 701,62, b = m. 452, 25 **calcolare** α, β, γ.

We analyze the following expression:

$$\operatorname{tang}\frac{1}{2}\gamma = \sqrt{\frac{1-\cos\gamma}{1+\cos\gamma}} = \sqrt{\frac{1-\frac{b}{a}}{1+\frac{b}{a}}} = \sqrt{\frac{a-b}{a+b}}.$$

We consider:

Sqrt((1-b/a)/(1+b/a))

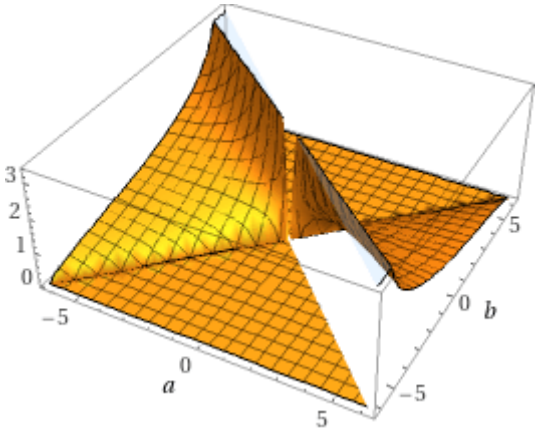
Input

$$\sqrt{\frac{1-\frac{b}{a}}{1+\frac{b}{a}}}$$

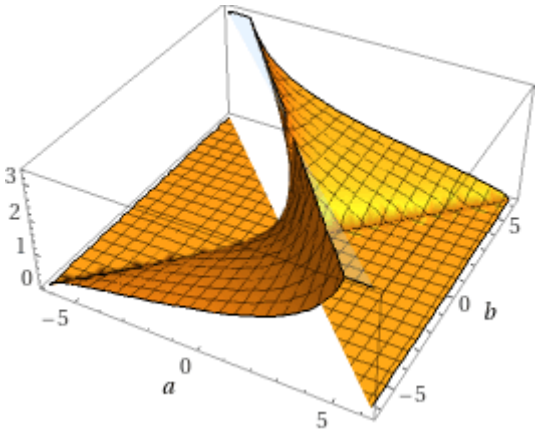
3D plots

Real part **(figures that can be related to the D-branes/Instantons)**

The key observation from the below plots and is that at $a = 1$, which is taken as the energy density of the universe at the Big Bang, with $b = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.

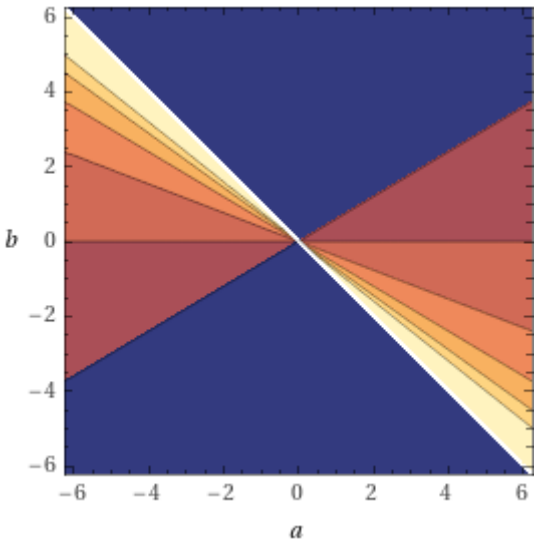


Imaginary part

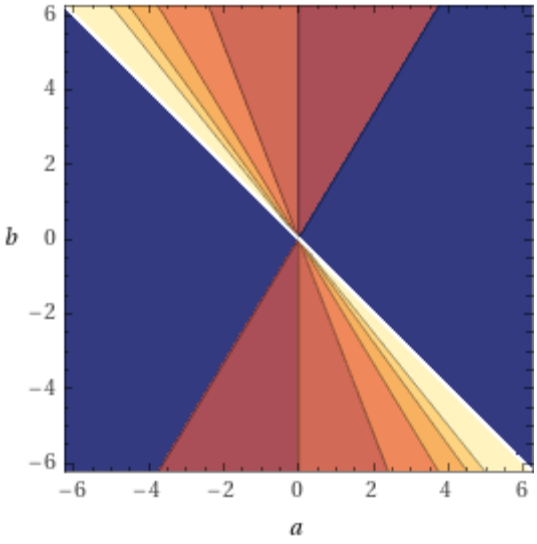


Contour plots

Real part



Imaginary part



Alternate forms

$$\sqrt{\frac{2\,a}{a+b}-1}$$

$$\sqrt{\frac{a-b}{a+b}}$$

$$\sqrt{-\frac{b-a}{a+b}}$$

Alternate forms assuming a and b are positive

$$\frac{\sqrt{1-\frac{b}{a}}}{\sqrt{\frac{a+b}{a}}}$$

$$\frac{\sqrt{1-\frac{b}{a}}}{\sqrt{\frac{b}{a}+1}}$$

Root

$a \neq 0, \quad b = a$

Property as a function

Parity

even

Series expansion at a=0

$$\begin{cases} -i + \frac{ia}{b^*} - \frac{ia^2}{2(b^*)^2} + \frac{ia^3}{2(b^*)^3} - \frac{3ia^4}{8(b^*)^4} + \frac{3ia^5}{8(b^*)^5} + O(a^6) & \mathrm{Im}\left(\frac{a(a^4 - a^3 b + a^2 b^2 - a b^3 + b^4)}{b^5}\right) < 0 \\ i - \frac{ia}{b} + \frac{ia^2}{2b^2} - \frac{ia^3}{2b^3} + \frac{3ia^4}{8b^4} - \frac{3ia^5}{8b^5} + O(a^6) & \text{(otherwise)} \end{cases}$$

z^* is the complex conjugate of z

$\mathrm{Im}(z)$ is the imaginary part of z

Series expansion at a=∞

$$1-\frac{b}{a}+\frac{b^2}{2a^2}-\frac{b^3}{2a^3}+O\left(\left(\frac{1}{a}\right)^4\right)$$

(Laurent series)

Derivative

$$\frac{\partial}{\partial a}\left(\sqrt{\frac{1-\frac{b}{a}}{1+\frac{b}{a}}}\right)=\frac{b}{\sqrt{\frac{a-b}{a+b}}\,(a+b)^2}$$

Indefinite integral

$$\int\sqrt{\frac{1-\frac{b}{a}}{1+\frac{b}{a}}}\,da=\frac{\sqrt{\frac{a-b}{a+b}}\left(\sqrt{a-b}\,(a+b)-2b^{3/2}\sqrt{\frac{a+b}{b}}\,\sinh^{-1}\left(\frac{\sqrt{a-b}}{\sqrt{2}\,\sqrt{b}}\right)\right)}{\sqrt{a-b}}+\text{constant}$$

$\sinh^{-1}(x)$ is the inverse hyperbolic sine function

Global minima

$$\min\left\{\sqrt{\frac{1-\frac{b}{a}}{1+\frac{b}{a}}}\right\}=0\ \text{for}\ a=b$$

Limit

$$\lim_{a\to\pm\infty}\sqrt{\frac{1-\frac{b}{a}}{1+\frac{b}{a}}}=1$$

$$\lim_{b\to\pm\infty}\sqrt{\frac{1-\frac{b}{a}}{1+\frac{b}{a}}}=i$$

Series representations

$$\sqrt{\frac{1-\frac{b}{a}}{1+\frac{b}{a}}}=\sqrt{-\frac{2b}{a+b}}\sum_{k=0}^{\infty}2^{-k}\left(-\frac{b}{a+b}\right)^{-k}\binom{\frac{1}{2}}{k}\quad\text{for } 2\left|\frac{b}{a+b}\right|>1$$

$$\sqrt{\frac{1-\frac{b}{a}}{1+\frac{b}{a}}}=\sum_{k=0}^{\infty}\frac{(-2)^k\left(-\frac{b}{a+b}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\quad\text{for } 2\left|\frac{b}{a+b}\right|<1$$

$$\sqrt{\frac{1-\frac{b}{a}}{1+\frac{b}{a}}}=\sqrt{-\frac{2b}{a+b}}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{2}\right)^k\left(-\frac{b}{a+b}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\quad\text{for } 2\left|\frac{b}{a+b}\right|>1$$

From

$$\operatorname{tang}\frac{1}{2}\gamma=\sqrt{\frac{(a-b)}{(a+b)}}$$

we obtain:

tang 1/2 β = sqrt((1-b/a)/(1+b/a))

Input

$$\tan\left(\frac{1}{2}\right)\beta=\sqrt{\frac{1-\frac{b}{a}}{1+\frac{b}{a}}}$$

Alternate forms

$$\beta \tan\left(\frac{1}{2}\right) = \sqrt{\frac{2a}{a+b} - 1}$$

$$\beta \tan\left(\frac{1}{2}\right) = \sqrt{\frac{a-b}{a+b}}$$

$$\beta = \cot\left(\frac{1}{2}\right)\sqrt{-\frac{b-a}{a+b}}$$

$\cot(x)$ is the cotangent function

Alternate form assuming a, b, and β are positive

$$\beta \tan\left(\frac{1}{2}\right) = \frac{\sqrt{1 - \frac{b}{a}}}{\sqrt{\frac{a+b}{a}}}$$

Real solutions

$$a < 0, \quad a \le b < -a, \quad \beta = \cot\left(\frac{1}{2}\right)\sqrt{\frac{a-b}{a+b}}$$

$$a > 0, \quad -a < b \le a, \quad \beta = \cot\left(\frac{1}{2}\right)\sqrt{\frac{a-b}{a+b}}$$

Solution for the variable β

$$\beta = \cot\left(\frac{1}{2}\right)\sqrt{\frac{a-b}{a+b}}$$

Implicit derivatives

$$\frac{\partial a(b,\,\beta)}{\partial \beta} = \frac{\sqrt{\frac{a-b}{a+b}}\,(a+b)^2 \tan\left(\frac{1}{2}\right)}{b}$$

$$\frac{\partial a(b,\,\beta)}{\partial b} = \frac{a}{b}$$

$$\frac{\partial b(a,\,\beta)}{\partial \beta} = -\frac{\sqrt{\frac{a-b}{a+b}}\,(a+b)^2 \tan\left(\frac{1}{2}\right)}{a}$$

$$\frac{\partial b(a,\,\beta)}{\partial a} = \frac{b}{a}$$

$$\frac{\partial \beta(a,\,b)}{\partial b} = -\frac{a\sqrt{\frac{a-b}{a+b}}\,\cot\left(\frac{1}{2}\right)}{a^2-b^2}$$

$$\frac{\partial \beta(a,\,b)}{\partial a} = \frac{b\sqrt{\frac{a-b}{a+b}}\,\cot\left(\frac{1}{2}\right)}{a^2-b^2}$$

From the following formula

$$\beta = \cot\left(\frac{1}{2}\right)\sqrt{\frac{a-b}{a+b}}$$

we obtain:

cot(1/2) sqrt((701.62 - 452.25)/(701.62 + 452.25))

Input interpretation

$$\cot\left(\frac{1}{2}\right)\sqrt{\frac{701.62-452.25}{701.62+452.25}}$$

$\cot(x)$ is the cotangent function

Result

0.850962616792192546289472922035346194033433702381130773508110387 7

…

0.85096261679….

Alternative representations

$$\cot\left(\frac{1}{2}\right)\sqrt{\frac{701.62-452.25}{701.62+452.25}} = \frac{\sqrt{\frac{249.37}{1153.87}}}{\tan\left(\frac{1}{2}\right)}$$

$$\cot\left(\frac{1}{2}\right)\sqrt{\frac{701.62-452.25}{701.62+452.25}} = i\coth\left(\frac{i}{2}\right)\sqrt{\frac{249.37}{1153.87}}$$

$$\cot\left(\frac{1}{2}\right)\sqrt{\frac{701.62-452.25}{701.62+452.25}} = \left(i+\frac{2i}{-1+e^{i}}\right)\sqrt{\frac{249.37}{1153.87}}$$

$\coth(x)$ is the hyperbolic cotangent function

i is the imaginary unit

Series representations

$$\cot\left(\frac{1}{2}\right)\sqrt{\frac{701.62-452.25}{701.62+452.25}} = -i\sum_{k_1=0}^{\infty}\sum_{k_2=-\infty}^{\infty}\frac{(-1)^{k_1}\,(-0.783884)^{k_1}\,e^{i\,k_2}\left(-\frac{1}{2}\right)_{k_1}\operatorname{sgn}(k_2)}{k_1!}$$

$$\cot\left(\frac{1}{2}\right)\sqrt{\frac{701.62-452.25}{701.62+452.25}} = -i\left(\exp\left(i\,\pi\left\lfloor\frac{\arg(0.216116-x)}{2\,\pi}\right\rfloor\right)\sqrt{x}\;\sum_{k_1=0}^{\infty}\sum_{k_2=-\infty}^{\infty}\frac{(-1)^{k_1}\,e^{i\,k_2}\,(0.216116-x)^{k_1}\,x^{-k_1}\left(-\frac{1}{2}\right)_{k_1}\operatorname{sgn}(k_2)}{k_1!}\right)$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\cot\left(\frac{1}{2}\right)\sqrt{\frac{701.62-452.25}{701.62+452.25}} = 2\exp\left(i\,\pi\left\lfloor\frac{\arg(0.216116-x)}{2\,\pi}\right\rfloor\right)\sqrt{x}\;\sum_{k_1=-\infty}^{\infty}\sum_{k_2=0}^{\infty}\frac{(-1)^{k_2}\,(0.216116-x)^{k_2}\,x^{-k_2}\left(-\frac{1}{2}\right)_{k_2}}{k_2!\left(1-4\,\pi^2\,k_1^2\right)}$$ for $(x \in \mathbb{R}$ and $x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\operatorname{sgn}(x)$ is the sign of x

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

$\mathbb{R}$ is the set of real numbers

Integral representations

$$\cot\left(\frac{1}{2}\right)\sqrt{\frac{701.62-452.25}{701.62+452.25}} = -\sqrt{0.216116}\int_{\frac{\pi}{2}}^{\frac{1}{2}}\csc^2(t)\,dt$$

$$\cot\left(\frac{1}{2}\right)\sqrt{\frac{701.62-452.25}{701.62+452.25}}=\frac{2\sqrt{0.216116}}{\pi}\int_0^{\infty}\frac{-1+t^{(-1+\pi)/\pi}}{-1+t^2}\,dt$$

csc(x) is the cosecant function

Thus:

0.85096261679 radians

Input interpretation

0.85096261679 radians

Unit conversions

850.96261679 mrad (milliradians)

48.756566465° (degrees)

---

48 degrees 45 arcminutes 23.63928 arcseconds

48° 45’ 23.63928”

From

$$\beta = (90^{\circ} - \gamma).$$

we obtain:

90° - (48 degrees 45 arcminutes 23.63928 arcseconds)

Input interpretation

90° (degrees) – 48 degrees 45 arcminutes 23.63928 arcseconds

Results

41.24343° (degrees)

2474.606' (arcminutes)

---

148 476.4" (arcseconds)

Unit conversions

719.8337 mrad (milliradians)

0.7198337 radians

2^{h} 44^{m} 58.424^{s} (right ascension)

45.82604 grads
(unit officially deprecated)

Unit conversions

45.82604 gons

41.24344° (degrees)

---

41 degrees 14 arcminutes 36.4 arcseconds

41° 14’ 36.4”

From

$$2\log c = [\log(a-b) + \log(a+b)]$$

we obtain:

log(701.62 - 452.25) + log(701.62 + 452.25)

Input interpretation

$\log_{10}(701.62 - 452.25) + \log_{10}(701.62 + 452.25)$

Result

5.459001087360134847840455359677134408040057787668366414472326653 5

…

5.45900108736….

Alternative representation

$$\log_{10}(701.62 - 452.25) + \log_{10}(701.62 + 452.25) = \frac{\log(249.37)}{\log(10)} + \frac{\log(1153.87)}{\log(10)}$$

$\log(x)$ is the natural logarithm

Thus:

2 log c = log(701.62 - 452.25) + log(701.62 + 452.25)

Input interpretation

$2\log_{10}(c) = \log_{10}(701.62 - 452.25) + \log_{10}(701.62 + 452.25)$

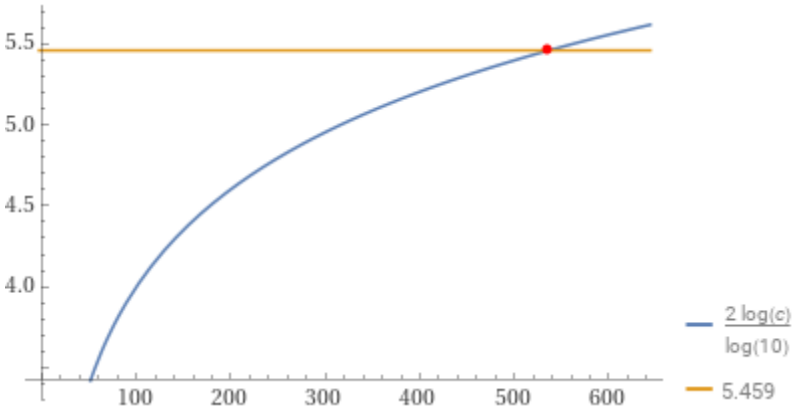
Results

$$\frac{2\log(c)}{\log(10)} = 5.459$$

$$\frac{2\log(c)}{\log(10)} = 5.459$$

log(x) is the natural logarithm

Plot **(figure that can be related to an open string)**



Alternate form assuming c is real

$\log(c) = 6.28491$

Alternate form assuming c>0

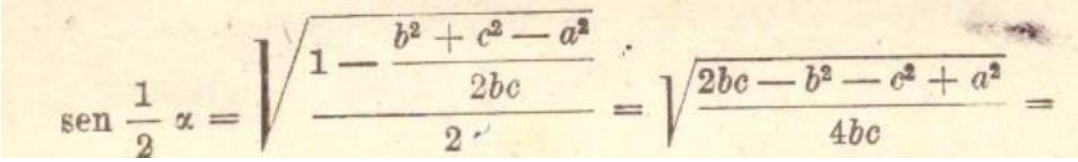
$$\frac{2\log(c)}{\log(2) + \log(5)} = 5.459$$

Solution

$c \approx 536.415$

536.415

Now, we analyze the following equation:



We consider:

Sqrt(((1-(1/(2bc)) (b^2 + c^2 – a^2))/2))

Input

$$\sqrt{\frac{1}{2}\left(1-\frac{1}{2\,b\,c}\left(b^2+c^2-a^2\right)\right)}$$

Exact result

$$\frac{\sqrt{1-\frac{-a^2+b^2+c^2}{2\,b\,c}}}{\sqrt{2}}$$

Alternate forms

$$\frac{1}{2}\sqrt{\frac{(a+b-c)\,(a-b+c)}{b\,c}}$$

$$\frac{1}{2}\sqrt{\frac{a^2-(b-c)^2}{b\,c}}$$

$$\frac{1}{2}\sqrt{\frac{a^2-b^2+2\,b\,c-c^2}{b\,c}}$$

Roots

$b\,(b-a) \neq 0, \quad c = b - a$

$b\,(a+b) \neq 0, \quad c = a + b$

Property as a function

Parity

even

Series expansion at a=0

$$\frac{1}{2}\sqrt{-\frac{b}{c}-\frac{c}{b}+2} - \frac{a^2\sqrt{-\frac{b}{c}-\frac{c}{b}+2}}{4\,(b-c)^2} - \frac{a^4\sqrt{-\frac{b}{c}-\frac{c}{b}+2}}{16\,(b-c)^4} + O\left(a^5\right)$$

(Taylor series)

Series expansion at a=∞

$$\frac{a\sqrt{\frac{a^2}{b\,c}}}{2\,a} - \frac{(b-c)^2\sqrt{\frac{a^2}{b\,c}}}{4\,a\,a} - \frac{(b-c)^4\sqrt{\frac{a^2}{b\,c}}}{16\,a\,a^3} - \frac{(b-c)^6\sqrt{\frac{a^2}{b\,c}}}{32\,a\,a^5} + O\left(\left(\frac{1}{a}\right)^9\right)$$

(generalized Puiseux series)

Derivative

$$\frac{\partial}{\partial a}\left(\sqrt{\frac{1}{2}\left(1-\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right) = \frac{a}{2\,b\,c\sqrt{\frac{a^2-(b-c)^2}{b\,c}}}$$

Indefinite integral

$$\int \frac{\sqrt{1-\frac{-a^2+b^2+c^2}{2\,b\,c}}}{\sqrt{2}}\,da = \frac{\sqrt{\frac{a^2-(b-c)^2}{b\,c}}\left(a\sqrt{a+b-c}\,(a-b+c)-2\,(c-b)^{5/2}\sqrt{-\frac{a-b+c}{b-c}}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{c-b}}\right)\right)}{4\sqrt{a+b-c}\,(a-b+c)} +$$

constant

$\sinh^{-1}(x)$ is the inverse hyperbolic sine function

Global minima

$$\min\left\{\sqrt{\frac{1}{2}\left(1-\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\} = 0 \text{ for } a = 0$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1-\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\} = 0 \text{ for } b = -\sqrt{a^2}$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1-\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\} = 0 \text{ for } b = \sqrt{a^2}$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1-\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\} = 0 \text{ for } b = c$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1-\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\} = 0 \text{ for } b = \sqrt{a^2}+c$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1-\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\}=0 \text{ for } c=-2\sqrt{a^2}$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1-\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\}=0 \text{ for } c=2\sqrt{a^2}$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1-\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\}=0 \text{ for } c=\sqrt{a^2}+b$$

From the indefinite integral result

$$\int \frac{\sqrt{1-\frac{-a^2+b^2+c^2}{2\,b\,c}}}{\sqrt{2}}\,da = \frac{\sqrt{\frac{a^2-(b-c)^2}{b\,c}}\left(a\sqrt{a+b-c}\,(a-b+c)-2\,(c-b)^{5/2}\sqrt{-\frac{a-b+c}{b-c}}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{c-b}}\right)\right)}{4\sqrt{a+b-c}\,(a-b+c)}+$$

constant

we obtain:

(sqrt((a^2 - (b - c)^2)/(b c)) (a sqrt(a + b - c) (a - b + c) - 2 (-b + c)^(5/2) sqrt(-(a - b + c)/(b - c)) sinh^(-1)(sqrt(a + b - c)/(sqrt(2) sqrt(-b + c)))))/(4 sqrt(a + b - c) (a - b + c))

Input

$$\frac{\sqrt{\frac{a^2-(b-c)^2}{b\,c}}\left(a\sqrt{a+b-c}\,(a-b+c)-2\,(-b+c)^{5/2}\sqrt{-\frac{a-b+c}{b-c}}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{-b+c}}\right)\right)}{4\sqrt{a+b-c}\,(a-b+c)}$$

$\sinh^{-1}(x)$ is the inverse hyperbolic sine function

Exact result

$$\frac{\sqrt{\frac{a^2-(b-c)^2}{b\,c}}\left(a\sqrt{a+b-c}\,(a-b+c)-2\,(c-b)^{5/2}\sqrt{\frac{-a+b-c}{b-c}}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{c-b}}\right)\right)}{4\sqrt{a+b-c}\,(a-b+c)}$$

Alternate forms

$$\frac{\sqrt{a+b-c}\left(a\sqrt{a+b-c}\,(a-b+c)-2\,(c-b)^{5/2}\sqrt{\frac{a}{c-b}+1}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{c-b}}\right)\right)}{4\,b\,c\sqrt{\frac{(a+b-c)\,(a-b+c)}{b\,c}}}$$

$$\left(\sqrt{\frac{a^2-(b-c)^2}{b\,c}}\left(a\sqrt{a+b-c}\,(a-b+c)-2\,(c-b)^{5/2}\sqrt{\frac{-a+b-c}{b-c}}\right.\right.$$
$$\left.\left.\log\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{c-b}}+\sqrt{\frac{a+b-c}{2\,(c-b)}+1}\right)\right)\right)\Big/\left(4\sqrt{a+b-c}\,(a-b+c)\right)$$

$$\left(\sqrt{\frac{a^2-b^2+2\,b\,c-c^2}{b\,c}}\right.$$
$$\left(a^2\sqrt{a+b-c}+a\,c\sqrt{a+b-c}-a\,b\sqrt{a+b-c}-2\,(c-b)^{5/2}\right.$$
$$\left.\left.\sqrt{\frac{-a+b-c}{b-c}}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{c-b}}\right)\right)\right)\Big/\left(4\sqrt{a+b-c}\,(a-b+c)\right)$$

$\log(x)$ is the natural logarithm

Expanded forms

$$-\frac{b^2\sqrt{c-b}\,\sqrt{\frac{-a+b-c}{b-c}}\,\sqrt{\frac{a^2-(b-c)^2}{bc}}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{c-b}}\right)}{2\sqrt{a+b-c}\,(a-b+c)}-\frac{c^2\sqrt{c-b}\,\sqrt{\frac{-a+b-c}{b-c}}\,\sqrt{\frac{a^2-(b-c)^2}{bc}}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{c-b}}\right)}{2\sqrt{a+b-c}\,(a-b+c)}+\frac{a^2\sqrt{\frac{a^2-(b-c)^2}{bc}}}{4(a-b+c)}+\frac{ac\sqrt{\frac{a^2-(b-c)^2}{bc}}}{4(a-b+c)}-\frac{ab\sqrt{\frac{a^2-(b-c)^2}{bc}}}{4(a-b+c)}+\frac{bc\sqrt{c-b}\,\sqrt{\frac{-a+b-c}{b-c}}\,\sqrt{\frac{a^2-(b-c)^2}{bc}}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{c-b}}\right)}{\sqrt{a+b-c}\,(a-b+c)}$$

$$\frac{a^2\sqrt{\frac{a^2}{bc}-\frac{c}{b}-\frac{b}{c}+2}}{4(a-b+c)}-\frac{ab\sqrt{\frac{a^2}{bc}-\frac{c}{b}-\frac{b}{c}+2}}{4(a-b+c)}+\frac{ac\sqrt{\frac{a^2}{bc}-\frac{c}{b}-\frac{b}{c}+2}}{4(a-b+c)}-\frac{(c-b)^{5/2}\sqrt{\frac{a^2}{bc}-\frac{c}{b}-\frac{b}{c}+2}\,\sqrt{-\frac{a}{b-c}-\frac{c}{b-c}+\frac{b}{b-c}}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2c-2b}}\right)}{2\sqrt{a+b-c}\,(a-b+c)}$$

Alternate forms assuming a, b, and c are positive

$$\frac{\sqrt{a^2-(b-c)^2}\left(\frac{2\sqrt{c-b}\,(b-c)^{3/2}\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{c-b}}\right)}{\sqrt{-a+b-c}\,\sqrt{a+b-c}}+a\right)}{4\sqrt{bc}}$$

$$\frac{a\sqrt{a^2-(b-c)^2}}{4\sqrt{bc}}-\frac{(c-b)^{5/2}\sqrt{a^2-(b-c)^2}\,\sqrt{-a+b-c}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{c-b}}\right)}{2\sqrt{b-c}\,\sqrt{bc}\,\sqrt{a+b-c}\,(a-b+c)}$$

Derivative

$$\frac{\partial}{\partial a}\left(\left(\sqrt{\frac{a^2-(b-c)^2}{b\,c}}\left(a\sqrt{a+b-c}\,(a-b+c)-2\,(-b+c)^{5/2}\sqrt{-\frac{a-b+c}{b-c}}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{-b+c}}\right)\right)\right)\Big/\left(4\sqrt{a+b-c}\,(a-b+c)\right)\right)=\frac{1}{2}\sqrt{\frac{a^2-(-b+c)^2}{b\,c}}$$

Indefinite integral

$$\int\frac{\sqrt{\frac{a^2-(b-c)^2}{b\,c}}\left(a\sqrt{a+b-c}\,(a-b+c)-2\sqrt{\frac{-a+b-c}{b-c}}\,(-b+c)^{5/2}\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{-b+c}}\right)\right)}{4\sqrt{a+b-c}\,(a-b+c)}\,da=\frac{1}{4\,b\,c\sqrt{\frac{a^2-(b-c)^2}{b\,c}}}\sqrt{a+b-c}\left(\frac{1}{3}\left(a^2+2\,(b-c)^2\right)\sqrt{a+b-c}\,(a-b+c)+2\,(b-c)^3\sqrt{a-b+c}\,\log\left(\sqrt{a+b-c}+\sqrt{a-b+c}\right)-2\,(c-b)^{5/2}\,(a+b-c)\sqrt{-\frac{a-b+c}{b-c}}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{c-b}}\right)\right)+\text{constant}$$

(assuming a complex-valued logarithm)

From the exact result

$$\frac{\sqrt{\frac{a^2-(b-c)^2}{b\,c}}\left(a\sqrt{a+b-c}\,(a-b+c)-2\,(c-b)^{5/2}\sqrt{\frac{-a+b-c}{b-c}}\,\sinh^{-1}\left(\frac{\sqrt{a+b-c}}{\sqrt{2}\,\sqrt{c-b}}\right)\right)}{4\sqrt{a+b-c}\,(a-b+c)}$$

(sqrt((a^2 - (b - c)^2)/(b c)) (a sqrt(a + b - c) (a - b + c) - 2 sqrt((-a + b - c)/(b - c)) (-b + c)^(5/2) sinh^(-1)(sqrt(a + b - c)/(sqrt(2) sqrt(-b + c)))))/(4 sqrt(a + b - c) (a - b + c))

for a = 2, b = 4 and c = 8:

(sqrt((2^2 - (4 - 8)^2)/(4*8)) (2 sqrt(2 + 4 - 8) (2 - 4 + 8) - 2 sqrt((-2 + 4 - 8)/(4 - 8)) (-4 + 8)^(5/2) sinh^(-1)(sqrt(2 + 4 - 8)/(sqrt(2) sqrt(-4 + 8)))))/(4 sqrt(2 + 4 - 8) (2 - 4 + 8))

Input

$$\frac{\sqrt{\frac{2^2-(4-8)^2}{4\times 8}}\left(2\sqrt{2+4-8}\,(2-4+8)-2\sqrt{\frac{-2+4-8}{4-8}}\,(-4+8)^{5/2}\sinh^{-1}\left(\frac{\sqrt{2+4-8}}{\sqrt{2}\,\sqrt{-4+8}}\right)\right)}{4\sqrt{2+4-8}\,(2-4+8)}$$

$\sinh^{-1}(x)$ is the inverse hyperbolic sine function

Exact result

$$\frac{12\,i\sqrt{2}-16\,i\sqrt{\frac{2}{3}}\,\pi}{32\sqrt{3}}$$

Decimal approximation

$-0.434294271845163778894652989005212525773360179813864604460146 03\ldots\,i$

-0.4342942718…. i

Property

$\frac{12\,i\sqrt{2}-16\,i\sqrt{\frac{2}{3}}\,\pi}{32\sqrt{3}}$ is a transcendental number

Alternate complex forms

$$0+\frac{\left(12\sqrt{2}-16\sqrt{\frac{2}{3}}\,\pi\right)i}{32\sqrt{3}}$$

$$\frac{1}{24}\left(4\sqrt{2}\,\pi-3\sqrt{6}\right)\left(\cos\left(-\frac{\pi}{2}\right)+i\sin\left(-\frac{\pi}{2}\right)\right)$$

$$\frac{1}{24}\left(4\sqrt{2}\,\pi - 3\sqrt{6}\right)e^{-(i\pi)/2}$$

i is the imaginary unit

Polar coordinates

$r = \frac{1}{24}\left(4\sqrt{2}\,\pi - 3\sqrt{6}\right)$ (radius), $\theta = -\frac{\pi}{2}$ (angle)

Alternate forms

$$\frac{i\left(9 - 4\sqrt{3}\,\pi\right)}{12\sqrt{6}}$$

$$-\frac{i\left(4\sqrt{3}\,\pi - 9\right)}{12\sqrt{6}}$$

$$\frac{1}{24}\,i\left(3\sqrt{6} - 4\sqrt{2}\,\pi\right)$$

Expanded form

$$\frac{1}{4}\,i\sqrt{\frac{3}{2}} - \frac{i\,\pi}{3\sqrt{2}}$$

Alternative representations

$$\frac{\sqrt{\frac{2^2-(4-8)^2}{4\times 8}}\left(2\sqrt{2+4-8}\,(2-4+8)-2\sqrt{\frac{-2+4-8}{4-8}}\,(-4+8)^{5/2}\sinh^{-1}\left(\frac{\sqrt{2+4-8}}{\sqrt{2}\,\sqrt{-4+8}}\right)\right)}{4\sqrt{2+4-8}\,(2-4+8)}$$
$$=\frac{\left(12\sqrt{-2}-2\,\mathrm{sc}^{-1}\left(\frac{\sqrt{-2}}{\sqrt{2}\,\sqrt{4}}\,\middle|\,1\right)4^{5/2}\sqrt{\frac{-6}{-4}}\right)\sqrt{\frac{1}{32}\left(4-(-4)^2\right)}}{24\sqrt{-2}}$$

$$\frac{\sqrt{\frac{2^2-(4-8)^2}{4\times 8}}\left(2\sqrt{2+4-8}\,(2-4+8)-2\sqrt{\frac{-2+4-8}{4-8}}\,(-4+8)^{5/2}\sinh^{-1}\left(\frac{\sqrt{2+4-8}}{\sqrt{2}\,\sqrt{-4+8}}\right)\right)}{4\sqrt{2+4-8}\,(2-4+8)}$$
$$=\frac{\left(12\sqrt{-2}-2\,\mathrm{sd}^{-1}\left(\frac{\sqrt{-2}}{\sqrt{2}\,\sqrt{4}}\,\middle|\,1\right)4^{5/2}\sqrt{\frac{-6}{-4}}\right)\sqrt{\frac{1}{32}\left(4-(-4)^2\right)}}{24\sqrt{-2}}$$

$$\frac{\sqrt{\frac{2^2-(4-8)^2}{4\times 8}}\left(2\sqrt{2+4-8}\,(2-4+8)-2\sqrt{\frac{-2+4-8}{4-8}}\,(-4+8)^{5/2}\sinh^{-1}\left(\frac{\sqrt{2+4-8}}{\sqrt{2}\,\sqrt{-4+8}}\right)\right)}{4\sqrt{2+4-8}\,(2-4+8)}$$
$$=\frac{\left(12\sqrt{-2}+2i\sin^{-1}\left(\frac{i\sqrt{-2}}{\sqrt{2}\,\sqrt{4}}\right)4^{5/2}\sqrt{\frac{-6}{-4}}\right)\sqrt{\frac{1}{32}\left(4-(-4)^2\right)}}{24\sqrt{-2}}$$

$\mathrm{sc}^{-1}(x\mid m)$ is the inverse of the Jacobi elliptic function sc

$\mathrm{sd}^{-1}(x\mid m)$ is the inverse of the Jacobi elliptic function sd

$\sin^{-1}(x)$ is the inverse sine function

From which:

sqrt(-2Pi((sqrt((2^2 - (4-8)^2)/(4*8)) (2 sqrt(2+4-8) (2-4+8) - 2 sqrt((-2+4-8)/(4-8)) (-4+8)^(5/2) sinh^(-1)(sqrt(2 + 4 - 8)/(sqrt(2) sqrt(-4 + 8)))))/(4 sqrt(2 + 4 - 8) (2 - 4 + 8))))

Input

$$\sqrt{\left(-2\pi\times\left(\sqrt{\frac{2^2-(4-8)^2}{4\times 8}}\left(2\sqrt{2+4-8}\,(2-4+8)-2\sqrt{\frac{-2+4-8}{4-8}}\,(-4+8)^{5/2}\sinh^{-1}\left(\frac{\sqrt{2+4-8}}{\sqrt{2}\,\sqrt{-4+8}}\right)\right)\right)\Big/\left(4\sqrt{2+4-8}\,(2-4+8)\right)\right)}$$

$\sinh^{-1}(x)$ is the inverse hyperbolic sine function

Exact result

$$\frac{1}{4}\sqrt[4]{-\frac{1}{3}}\,\sqrt{\pi\left(16\sqrt{\frac{2}{3}}\,\pi-12\sqrt{2}\right)}$$

Decimal approximation

1.168064935662780310649088743563349516865118660734617758743953487…

+

1.168064935662780310649088743563349516865118660734617758743953487… i

Property

$\frac{1}{4}\sqrt[4]{-\frac{1}{3}}\,\sqrt{\pi\left(-12\sqrt{2}+16\sqrt{\frac{2}{3}}\,\pi\right)}$ is a transcendental number

Alternate complex forms

$$\frac{\sqrt{\pi\left(-12\sqrt{2}+16\sqrt{\frac{2}{3}}\,\pi\right)}}{4\sqrt{2}\,\sqrt[4]{3}}+\frac{\sqrt{\pi\left(-12\sqrt{2}+16\sqrt{\frac{2}{3}}\,\pi\right)}\,i}{4\sqrt{2}\,\sqrt[4]{3}}$$

$$\frac{\sqrt{\pi\left(4\sqrt{3}\,\pi-9\right)}\left(\cos\left(\frac{\pi}{4}\right)+i\sin\left(\frac{\pi}{4}\right)\right)}{6^{3/4}}$$

$$\frac{\sqrt{\pi\left(4\sqrt{3}\,\pi-9\right)}\;e^{(i\pi)/4}}{6^{3/4}}$$

i is the imaginary unit

Polar coordinates

$r \approx 1.6519$ (radius), $\theta \approx 0.78540$ (angle)

1.6519 result quite near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164.2696$ i.e. 1.6557845...

Alternate forms

$$\frac{\sqrt[4]{-1}\,\sqrt{\pi\left(4\sqrt{3}\,\pi-9\right)}}{6^{3/4}}$$

$$\frac{1}{2}\sqrt[4]{-\frac{1}{3}}\,\sqrt{\pi\left(4\sqrt{\frac{2}{3}}\,\pi-3\sqrt{2}\right)}$$

$$\frac{\left(\frac{1}{4}+\frac{i}{4}\right)\sqrt{\pi\left(16\sqrt{\frac{2}{3}}\,\pi-12\sqrt{2}\right)}}{\sqrt{2}\,\sqrt[4]{3}}$$

All 2nd roots of -(π (12 i sqrt(2)-16 i sqrt(2/3) π))/(16 sqrt(3))

$$\frac{\sqrt{\pi\left(16\sqrt{\frac{2}{3}}\,\pi-12\sqrt{2}\right)}\,e^{(i\pi)/4}}{4\sqrt[4]{3}}\approx 1.1681+1.1681\,i \quad \text{(principal root)}$$

$$\frac{\sqrt{\pi\left(16\sqrt{\frac{2}{3}}\,\pi-12\sqrt{2}\right)}\,e^{-(3i\pi)/4}}{4\sqrt[4]{3}}\approx -1.1681-1.1681\,i$$

Alternative representations

$$\sqrt{\left(-\left(\left((2\pi)\left(\sqrt{\frac{2^2-(4-8)^2}{4\times 8}}\left(2\sqrt{2+4-8}\,(2-4+8)-2\sqrt{\frac{-2+4-8}{4-8}}\,(-4+8)^{5/2}\sinh^{-1}\left(\frac{\sqrt{2+4-8}}{\sqrt{2}\,\sqrt{-4+8}}\right)\right)\right)\Big/\left(4\sqrt{2+4-8}\,(2-4+8)\right)\right)\right)\right)}=\sqrt{-\frac{2\pi\left(12\sqrt{-2}-2\,\mathrm{sc}^{-1}\left(\frac{\sqrt{-2}}{\sqrt{2}\,\sqrt{4}}\,\middle|\,1\right)4^{5/2}\sqrt{\frac{-6}{-4}}\right)\sqrt{\frac{1}{32}\left(4-(-4)^2\right)}}{24\sqrt{-2}}}$$

$$\sqrt{\left(-\left(\left((2\pi)\left(\sqrt{\frac{2^2-(4-8)^2}{4\times 8}}\left(2\sqrt{2+4-8}\,(2-4+8)-2\sqrt{\frac{-2+4-8}{4-8}}\,(-4+8)^{5/2}\sinh^{-1}\left(\frac{\sqrt{2+4-8}}{\sqrt{2}\,\sqrt{-4+8}}\right)\right)\right)\Big/\left(4\sqrt{2+4-8}\,(2-4+8)\right)\right)\right)\right)=\sqrt{-\frac{2\pi\left(12\sqrt{-2}-2\,\mathrm{sd}^{-1}\left(\frac{\sqrt{-2}}{\sqrt{2}\,\sqrt{4}}\,\middle|\,1\right)4^{5/2}\sqrt{\frac{-6}{-4}}\right)\sqrt{\frac{1}{32}\left(4-(-4)^2\right)}}{24\sqrt{-2}}}$$

$$\sqrt{\left(-\left(\left((2\pi)\left(\sqrt{\frac{2^2-(4-8)^2}{4\times 8}}\left(2\sqrt{2+4-8}\,(2-4+8)-2\sqrt{\frac{-2+4-8}{4-8}}\,(-4+8)^{5/2}\sinh^{-1}\left(\frac{\sqrt{2+4-8}}{\sqrt{2}\,\sqrt{-4+8}}\right)\right)\right)\Big/\left(4\sqrt{2+4-8}\,(2-4+8)\right)\right)\right)\right)=\sqrt{-\frac{2\pi\left(12\sqrt{-2}+2i\sin^{-1}\left(\frac{i\sqrt{-2}}{\sqrt{2}\,\sqrt{4}}\right)4^{5/2}\sqrt{\frac{-6}{-4}}\right)\sqrt{\frac{1}{32}\left(4-(-4)^2\right)}}{24\sqrt{-2}}}$$

$\mathrm{sc}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function sc

$\mathrm{sd}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function sd

$\sin^{-1}(x)$ is the inverse sine function

Series representations

$$\sqrt{\left(-\left(\left((2\pi)\left(\sqrt{\frac{2^2-(4-8)^2}{4\times 8}}\left(2\sqrt{2+4-8}\,(2-4+8)-2\sqrt{\frac{-2+4-8}{4-8}}\,(-4+8)^{5/2}\sinh^{-1}\left(\frac{\sqrt{2+4-8}}{\sqrt{2}\,\sqrt{-4+8}}\right)\right)\right)\Big/\left(4\sqrt{2+4-8}\,(2-4+8)\right)\right)\right)\right)} =$$

$$\sqrt{-1-\pi\sqrt{-\frac{3}{8}}+\frac{16\pi\sinh^{-1}\left(\frac{\sqrt{-2}}{\sqrt{2}\,\sqrt{4}}\right)\sqrt{-\frac{3}{8}}\,\sqrt{\frac{3}{2}}}{3\sqrt{-2}}}$$

$$\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1-\pi\sqrt{-\frac{3}{8}}+\frac{16\pi\sinh^{-1}\left(\frac{\sqrt{-2}}{\sqrt{2}\,\sqrt{4}}\right)\sqrt{-\frac{3}{8}}\,\sqrt{\frac{3}{2}}}{3\sqrt{-2}}\right)^{-k}$$

$$\sqrt{\left(-\left(\left((2\pi)\left(\sqrt{\frac{2^2-(4-8)^2}{4\times 8}}\left(2\sqrt{2+4-8}\,(2-4+8)-\right.\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\left.2\sqrt{\frac{-2+4-8}{4-8}}\,(-4+8)^{5/2}\sinh^{-1}\left(\frac{\sqrt{2+4-8}}{\sqrt{2}\,\sqrt{-4+8}}\right)\right)\right)\right)\right)\Big/$$

$$\left.\left.\left(4\sqrt{2+4-8}\,(2-4+8)\right)\right)\right)=$$

$$\sqrt{-1-\pi\sqrt{-\frac{3}{8}}+\frac{16\pi\sinh^{-1}\left(\frac{\sqrt{-2}}{\sqrt{2}\,\sqrt{4}}\right)\sqrt{-\frac{3}{8}}\,\sqrt{\frac{3}{2}}}{3\sqrt{-2}}}$$

$$\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1-\pi\sqrt{-\frac{3}{8}}+\frac{16\pi\sinh^{-1}\left(\frac{\sqrt{-2}}{\sqrt{2}\,\sqrt{4}}\right)\sqrt{-\frac{3}{8}}\,\sqrt{\frac{3}{2}}}{3\sqrt{-2}}\right)^{-k}}{k!}$$

$$\sqrt{\left(-\left(\left((2\pi)\left(\sqrt{\frac{2^2-(4-8)^2}{4\times 8}}\left(2\sqrt{2+4-8}\,(2-4+8)-2\sqrt{\frac{-2+4-8}{4-8}}\,(-4+8)^{5/2}\sinh^{-1}\left(\frac{\sqrt{2+4-8}}{\sqrt{2}\,\sqrt{-4+8}}\right)\right)\right)\right)\Big/\left(4\sqrt{2+4-8}\,(2-4+8)\right)\right)\right)}=$$

$$\exp\left(\frac{i\pi\left\lfloor\frac{\arg\left(-x-\pi\sqrt{-\frac{3}{8}}+\frac{16\pi\sinh^{-1}\left(\frac{\sqrt{-2}}{\sqrt{2}\,\sqrt{4}}\right)\sqrt{-\frac{3}{8}}\,\sqrt{\frac{3}{2}}}{3\sqrt{-2}}\right)}{2\pi}\right\rfloor}{\sqrt{x}}\right)\sum_{k=0}^{\infty}\frac{(-1)^k\,x^{-k}\left(-\frac{1}{2}\right)_k\left(-x-\pi\sqrt{-\frac{3}{8}}+\frac{16\pi\sinh^{-1}\left(\frac{\sqrt{-2}}{\sqrt{2}\,\sqrt{4}}\right)\sqrt{-\frac{3}{8}}\,\sqrt{\frac{3}{2}}}{3\sqrt{-2}}\right)^k}{k!}$$

for $(x\in\mathbb{R}$ and $x<0)$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

$\mathbb{R}$ is the set of real numbers

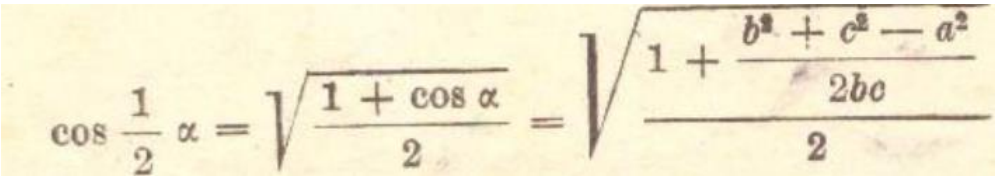
Integral representations

$$\sqrt{\left(-\left(\left((2\pi)\left(\sqrt{\frac{2^2-(4-8)^2}{4\times 8}}\left(2\sqrt{2+4-8}\,(2-4+8)-2\sqrt{\frac{-2+4-8}{4-8}}\,(-4+8)^{5/2}\sinh^{-1}\left(\frac{\sqrt{2+4-8}}{\sqrt{2}\,\sqrt{-4+8}}\right)\right)\right)\right)\right)/\left(4\sqrt{2+4-8}\,(2-4+8)\right)\right)\right)=\sqrt{\frac{\pi\sqrt{-\frac{3}{8}}\left(16\sqrt{\frac{3}{2}}\int_0^1\frac{1}{\sqrt{1+\frac{t^2\sqrt{-2}^2}{\sqrt{2}^2\sqrt{4}^2}}}\,dt-3\sqrt{2}\,\sqrt{4}\right)}{3\sqrt{2}\,\sqrt{4}}}$$

$$\sqrt{\left(-\left(\left((2\pi)\left(\sqrt{\frac{2^2-(4-8)^2}{4\times 8}}\left(2\sqrt{2+4-8}\,(2-4+8)-2\sqrt{\frac{-2+4-8}{4-8}}\,(-4+8)^{5/2}\sinh^{-1}\left(\frac{\sqrt{2+4-8}}{\sqrt{2}\,\sqrt{-4+8}}\right)\right)\right)\right)\right)/\left(4\sqrt{2+4-8}\,(2-4+8)\right)\right)\right)=\sqrt{\left(\frac{1}{3}\sqrt{-\frac{3}{8}}\left(-3\pi+\frac{4\sqrt{\frac{3}{2}}}{i\sqrt{2}\,\sqrt{4}\,\sqrt{\pi}}\int_{-i\infty+\gamma}^{i\infty+\gamma}\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)\left(1+\frac{\sqrt{-2}^2}{\sqrt{2}^2\sqrt{4}^2}\right)^{-s}ds\right)\right)\right)}\quad\text{for } 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Now, we analyze the following equation:



$$\cos\frac{1}{2}\alpha = \sqrt{\frac{1+\cos\alpha}{2}} = \sqrt{\frac{1+\frac{b^2+c^2-a^2}{2bc}}{2}}$$

We consider:

sqrt(((1+(1/(2bc)) (b^2 + c^2 – a^2))/2))

Input

$$\sqrt{\frac{1}{2}\left(1+\frac{1}{2\,b\,c}\left(b^2+c^2-a^2\right)\right)}$$

Exact result

$$\frac{\sqrt{\frac{-a^2+b^2+c^2}{2\,b\,c}+1}}{\sqrt{2}}$$

Alternate forms

$$\frac{1}{2}\sqrt{\frac{(-a+b+c)\,(a+b+c)}{b\,c}}$$

$$\frac{1}{2}\sqrt{\frac{(b+c)^2-a^2}{b\,c}}$$

$$\frac{1}{2}\sqrt{\frac{-a^2+b^2+2\,b\,c+c^2}{b\,c}}$$

Roots

$b\,(a-b)\neq 0\,,\quad c=a-b$

$-b\,(a+b)\neq 0\,,\quad c=-a-b$

Property as a function

Parity

even

Series expansion at a=0

$$\frac{1}{2}\sqrt{\frac{(b+c)^2}{b\,c}}-\frac{a^2\sqrt{\frac{(b+c)^2}{b\,c}}}{4\,(b+c)^2}-\frac{a^4\sqrt{\frac{(b+c)^2}{b\,c}}}{16\,(b+c)^4}+O\left(a^5\right)$$

(Taylor series)

Series expansion at a=∞

$$\frac{a\sqrt{-\frac{a^2}{b\,c}}}{2\,a}-\frac{(b+c)^2\sqrt{-\frac{a^2}{b\,c}}}{4\,a\,a}-\frac{(b+c)^4\sqrt{-\frac{a^2}{b\,c}}}{16\,a\,a^3}-\frac{(b+c)^6\sqrt{-\frac{a^2}{b\,c}}}{32\,a\,a^5}+O\left(\left(\frac{1}{a}\right)^9\right)$$

(generalized Puiseux series)

Derivative

$$\frac{\partial}{\partial a}\left(\sqrt{\frac{1}{2}\left(1+\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right)=-\frac{a}{2\,b\,c\sqrt{\frac{(b+c)^2-a^2}{b\,c}}}$$

Indefinite integral

$$\int \frac{\sqrt{1+\frac{-a^2+b^2+c^2}{2\,b\,c}}}{\sqrt{2}}\,da =$$

$$\frac{1}{4}\sqrt{\frac{(b+c)^2-a^2}{b\,c}}\left(a-\frac{2\,(b+c)^{3/2}\sin^{-1}\left(\frac{\sqrt{-a+b+c}}{\sqrt{2}\,\sqrt{b+c}}\right)}{\sqrt{-a+b+c}\,\sqrt{\frac{a+b+c}{b+c}}}\right) + \text{constant}$$

$\sin^{-1}(x)$ is the inverse sine function

Global minima

$$\min\left\{\sqrt{\frac{1}{2}\left(1+\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\} = 0 \text{ for } a = 0$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1+\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\} = 0 \text{ for } \sqrt{a^2} = b+c$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1+\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\} = 0 \text{ for } b = -\sqrt{a^2}$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1+\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\} = 0 \text{ for } b = \sqrt{a^2}$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1+\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\} = 0 \text{ for } b = -\sqrt{a^2} - c$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1+\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\}=0 \text{ for } c=-2\sqrt{a^2}$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1+\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\}=0 \text{ for } c=2\sqrt{a^2}$$

$$\min\left\{\sqrt{\frac{1}{2}\left(1+\frac{b^2+c^2-a^2}{2\,b\,c}\right)}\right\}=0 \text{ for } c=-b$$

Series representations

$$\sqrt{\frac{1}{2}\left(1+\frac{b^2+c^2-a^2}{2\,b\,c}\right)}=\sqrt{\frac{-a^2+(b-c)^2}{4\,b\,c}}\sum_{k=0}^{\infty}4^k\left(\frac{-a^2+(b-c)^2}{b\,c}\right)^{-k}\binom{\frac{1}{2}}{k}$$
$$\text{for } \left|\frac{-a^2+(b-c)^2}{b\,c}\right|>4$$

$$\sqrt{\frac{1}{2}\left(1+\frac{b^2+c^2-a^2}{2\,b\,c}\right)}=\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(\frac{-a^2+(b-c)^2}{b\,c}\right)^k\left(-\frac{1}{2}\right)_k}{k!} \text{ for } \left|\frac{-a^2+(b-c)^2}{b\,c}\right|<4$$

$$\sqrt{\frac{1}{2}\left(1+\frac{b^2+c^2-a^2}{2\,b\,c}\right)}=\sqrt{\frac{-a^2+(b-c)^2}{4\,b\,c}}\sum_{k=0}^{\infty}\frac{(-4)^k\left(\frac{-a^2+(b-c)^2}{b\,c}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$
$$\text{for } \left|\frac{-a^2+(b-c)^2}{b\,c}\right|>4$$

$\binom{n}{m}$ is the binomial coefficient

$|z|$ is the absolute value of z

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

From the indefinite integral result

$$\int \frac{\sqrt{1+\frac{-a^2+b^2+c^2}{2\,b\,c}}}{\sqrt{2}}\,da =$$

$$\frac{1}{4}\sqrt{\frac{(b+c)^2-a^2}{b\,c}}\left(a-\frac{2\,(b+c)^{3/2}\sin^{-1}\left(\frac{\sqrt{-a+b+c}}{\sqrt{2}\,\sqrt{b+c}}\right)}{\sqrt{-a+b+c}\,\sqrt{\frac{a+b+c}{b+c}}}\right)+\text{constant}$$

we obtain:

1/4 sqrt((-a^2 + (b + c)^2)/(b c)) (a - (2 (b + c)^(3/2) sin^(-1)(sqrt(-a + b + c)/(sqrt(2) sqrt(b + c))))/(sqrt(-a + b + c) sqrt((a + b + c)/(b + c))))

Input

$$\frac{1}{4}\sqrt{\frac{-a^2+(b+c)^2}{b\,c}}\left(a-\frac{2\,(b+c)^{3/2}\sin^{-1}\left(\frac{\sqrt{-a+b+c}}{\sqrt{2}\,\sqrt{b+c}}\right)}{\sqrt{-a+b+c}\,\sqrt{\frac{a+b+c}{b+c}}}\right)$$

$\sin^{-1}(x)$ is the inverse sine function

Alternate forms

$$\sqrt{-\frac{a^2-(b+c)^2}{b\,c}}\left(\frac{a}{4}-\frac{(b+c)^{3/2}\sin^{-1}\left(\frac{\sqrt{-a+b+c}}{\sqrt{2}\,\sqrt{b+c}}\right)}{2\sqrt{-a+b+c}\,\sqrt{\frac{a+b+c}{b+c}}}\right)$$

$$\frac{\sqrt{\frac{-a^2+b^2+2bc+c^2}{bc}}\left(a\sqrt{-a+b+c}\sqrt{\frac{a+b+c}{b+c}}-2(b+c)^{3/2}\sin^{-1}\left(\frac{\sqrt{-a+b+c}}{\sqrt{2}\sqrt{b+c}}\right)\right)}{4\sqrt{-a+b+c}\sqrt{\frac{a+b+c}{b+c}}}$$

$$\frac{1}{4}a\sqrt{\frac{(b+c)^2-a^2}{bc}}+\frac{i(b+c)^{3/2}\sqrt{\frac{(b+c)^2-a^2}{bc}}\log\left(\sqrt{1-\frac{-a+b+c}{2(b+c)}}+\frac{i\sqrt{-a+b+c}}{\sqrt{2}\sqrt{b+c}}\right)}{2\sqrt{-a+b+c}\sqrt{\frac{a+b+c}{b+c}}}$$

$\log(x)$ is the natural logarithm

Expanded forms

$$-\frac{b^2\sqrt{b+c}\sqrt{\frac{a+b+c}{b+c}}\sqrt{\frac{(b+c)^2-a^2}{bc}}\sin^{-1}\left(\frac{\sqrt{-a+b+c}}{\sqrt{2}\sqrt{b+c}}\right)}{2\sqrt{-a+b+c}(a+b+c)}-$$

$$\frac{c^2\sqrt{b+c}\sqrt{\frac{a+b+c}{b+c}}\sqrt{\frac{(b+c)^2-a^2}{bc}}\sin^{-1}\left(\frac{\sqrt{-a+b+c}}{\sqrt{2}\sqrt{b+c}}\right)}{2\sqrt{-a+b+c}(a+b+c)}+$$

$$\frac{1}{4}a\sqrt{\frac{(b+c)^2-a^2}{bc}}-\frac{bc\sqrt{b+c}\sqrt{\frac{a+b+c}{b+c}}\sqrt{\frac{(b+c)^2-a^2}{bc}}\sin^{-1}\left(\frac{\sqrt{-a+b+c}}{\sqrt{2}\sqrt{b+c}}\right)}{\sqrt{-a+b+c}(a+b+c)}$$

$$\frac{1}{4}a\sqrt{-\frac{a^2}{bc}+\frac{c}{b}+\frac{b}{c}+2}-\frac{(b+c)^{3/2}\sqrt{-\frac{a^2}{bc}+\frac{c}{b}+\frac{b}{c}+2}\sin^{-1}\left(\frac{\sqrt{-a+b+c}}{\sqrt{2b+2c}}\right)}{2\sqrt{-a+b+c}\sqrt{\frac{a}{b+c}+\frac{b}{b+c}+\frac{c}{b+c}}}$$

Alternate forms assuming a, b, and c are positive

$$\frac{1}{4}\sqrt{(b+c)^2-a^2}\left(\frac{a}{\sqrt{bc}}-\frac{2(b+c)^2\sin^{-1}\left(\frac{\sqrt{-a+b+c}}{\sqrt{2}\sqrt{b+c}}\right)}{\sqrt{-a+b+c}\sqrt{bc(a+b+c)}}\right)$$

$$\frac{a\sqrt{(b+c)^2-a^2}}{4\sqrt{b\,c}}-\frac{(b+c)^2\sqrt{(b+c)^2-a^2}\ \sin^{-1}\left(\frac{\sqrt{-a+b+c}}{\sqrt{2}\ \sqrt{b+c}}\right)}{2\sqrt{-a+b+c}\ \sqrt{b\,c\,(a+b+c)}}$$

Derivative

$$\frac{\partial}{\partial a}\left(\frac{1}{4}\sqrt{\frac{-a^2+(b+c)^2}{b\,c}}\left(a-\frac{2\,(b+c)^{3/2}\sin^{-1}\left(\frac{\sqrt{-a+b+c}}{\sqrt{2}\ \sqrt{b+c}}\right)}{\sqrt{-a+b+c}\ \sqrt{\frac{a+b+c}{b+c}}}\right)\right)=\frac{1}{2}\sqrt{\frac{-a^2+(b+c)^2}{b\,c}}$$

From the following alternate form

$$\frac{a\sqrt{(b+c)^2-a^2}}{4\sqrt{b\,c}}-\frac{(b+c)^2\sqrt{(b+c)^2-a^2}\ \sin^{-1}\left(\frac{\sqrt{-a+b+c}}{\sqrt{2}\ \sqrt{b+c}}\right)}{2\sqrt{-a+b+c}\ \sqrt{b\,c\,(a+b+c)}}$$

(a sqrt(-a^2 + (b + c)^2))/(4 sqrt(b c)) - ((b + c)^2 sqrt(-a^2 + (b + c)^2) sin^(-1)(sqrt(-a + b + c)/(sqrt(2) sqrt(b + c))))/(2 sqrt(-a + b + c) sqrt(b c (a + b + c)))

for a = 2, b = 4 and c = 8:

(2 sqrt(-2^2 + (4 + 8)^2))/(4 sqrt(4*8)) - ((4 + 8)^2 sqrt(-2^2 + (4 + 8)^2) sin^(-1)(sqrt(-2 + 4 + 8)/(sqrt(2) sqrt(4 + 8))))/(2 sqrt(-2 + 4 + 8) sqrt(4*8 (2 + 4 + 8)))

Input

$$\frac{2\sqrt{-2^2+(4+8)^2}}{4\sqrt{4\times 8}}-\frac{(4+8)^2\sqrt{-2^2+(4+8)^2}\ \sin^{-1}\left(\frac{\sqrt{-2+4+8}}{\sqrt{2}\ \sqrt{4+8}}\right)}{2\sqrt{-2+4+8}\ \sqrt{4\times 8\,(2+4+8)}}$$

$\sin^{-1}(x)$ is the inverse sine function

Exact Result

$$\frac{\sqrt{\frac{35}{2}}}{4} - 9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)$$

(result in radians)

Decimal approximation

−7.8850285268725887698878929577281692181975642308710262109502778 76

…

(result in radians)

-7.88502852687….

Property

$$\frac{\sqrt{\frac{35}{2}}}{4} - 9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)$$ is a transcendental number

Alternate forms

$$\frac{\sqrt{\frac{35}{2}}}{4} - 9\sqrt{2}\,\tan^{-1}\left(\sqrt{\frac{5}{7}}\right)$$

$$\frac{1}{8}\left(\sqrt{70} - 72\sqrt{2}\,\csc^{-1}\left(2\sqrt{\frac{3}{5}}\right)\right)$$

$$\frac{\sqrt{\frac{35}{2}}}{4} - 9\sqrt{2}\,\csc^{-1}\left(2\sqrt{\frac{3}{5}}\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

$\csc^{-1}(x)$ is the inverse cosecant function

Alternative representations

$$\frac{2\sqrt{-2^2+(4+8)^2}}{4\sqrt{4\times 8}} - \frac{(4+8)^2\sqrt{-2^2+(4+8)^2}\,\sin^{-1}\left(\frac{\sqrt{-2+4+8}}{\sqrt{2}\,\sqrt{4+8}}\right)}{2\sqrt{-2+4+8}\,\sqrt{4\times 8\,(2+4+8)}} =$$
$$\frac{2\sqrt{-4+12^2}}{4\sqrt{32}} - \frac{\mathrm{sd}^{-1}\left(\frac{\sqrt{10}}{\sqrt{2}\,\sqrt{12}}\,\middle|\,0\right)12^2\sqrt{-4+12^2}}{2\sqrt{10}\,\sqrt{448}}$$

$$\frac{2\sqrt{-2^2+(4+8)^2}}{4\sqrt{4\times 8}} - \frac{(4+8)^2\sqrt{-2^2+(4+8)^2}\,\sin^{-1}\left(\frac{\sqrt{-2+4+8}}{\sqrt{2}\,\sqrt{4+8}}\right)}{2\sqrt{-2+4+8}\,\sqrt{4\times 8\,(2+4+8)}} =$$
$$\frac{2\sqrt{-4+12^2}}{4\sqrt{32}} - \frac{\mathrm{sn}^{-1}\left(\frac{\sqrt{10}}{\sqrt{2}\,\sqrt{12}}\,\middle|\,0\right)12^2\sqrt{-4+12^2}}{2\sqrt{10}\,\sqrt{448}}$$

$$\frac{2\sqrt{-2^2+(4+8)^2}}{4\sqrt{4\times 8}} - \frac{(4+8)^2\sqrt{-2^2+(4+8)^2}\,\sin^{-1}\left(\frac{\sqrt{-2+4+8}}{\sqrt{2}\,\sqrt{4+8}}\right)}{2\sqrt{-2+4+8}\,\sqrt{4\times 8\,(2+4+8)}} =$$
$$\frac{2\sqrt{-4+12^2}}{4\sqrt{32}} + \frac{i\sinh^{-1}\left(\frac{i\sqrt{10}}{\sqrt{2}\,\sqrt{12}}\right)12^2\sqrt{-4+12^2}}{2\sqrt{10}\,\sqrt{448}}$$

$\mathrm{sd}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function sd

$\mathrm{sn}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function sn

$\sinh^{-1}(x)$ is the inverse hyperbolic sine function

i is the imaginary unit

Series representations

$$\frac{2\sqrt{-2^2+(4+8)^2}}{4\sqrt{4\times 8}}-\frac{(4+8)^2\sqrt{-2^2+(4+8)^2}\ \sin^{-1}\left(\frac{\sqrt{-2+4+8}}{\sqrt{2}\ \sqrt{4+8}}\right)}{2\sqrt{-2+4+8}\ \sqrt{4\times 8\,(2+4+8)}}=$$
$$\frac{\sqrt{\frac{35}{2}}}{4}-\frac{36\sqrt{2}\ \sum_{k=0}^{\infty}\frac{T_{1+2k}\left(\sqrt{\frac{5}{3}}\right)}{(1+2k)^2}}{\pi}$$

$$\frac{2\sqrt{-2^2+(4+8)^2}}{4\sqrt{4\times 8}}-\frac{(4+8)^2\sqrt{-2^2+(4+8)^2}\ \sin^{-1}\left(\frac{\sqrt{-2+4+8}}{\sqrt{2}\ \sqrt{4+8}}\right)}{2\sqrt{-2+4+8}\ \sqrt{4\times 8\,(2+4+8)}}=$$
$$\frac{\sqrt{\frac{35}{2}}}{4}-9\sqrt{2}\sum_{k=0}^{\infty}\frac{\left(\frac{3}{5}\right)^{-1/2-k}2^{-1-2k}\left(\frac{1}{2}\right)_k}{k!+2k\,k!}$$

$$\frac{2\sqrt{-2^2+(4+8)^2}}{4\sqrt{4\times 8}}-\frac{(4+8)^2\sqrt{-2^2+(4+8)^2}\ \sin^{-1}\left(\frac{\sqrt{-2+4+8}}{\sqrt{2}\ \sqrt{4+8}}\right)}{2\sqrt{-2+4+8}\ \sqrt{4\times 8\,(2+4+8)}}=$$
$$\frac{\sqrt{\frac{35}{2}}}{4}-9\sqrt{\frac{\pi}{2}}\sum_{k=0}^{\infty}\frac{{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};z_0^2\right)\left(\sqrt{\frac{5}{3}}-2z_0\right)^k z_0^{1-k}}{k!}$$

for $(z_0 \notin \mathbb{R}$ or $((\text{not } 1 \le z_0 < \infty)$ and $(\text{not } -\infty < z_0 \le -1)))$

$T_n(x)$ is the Chebyshev polynomial of the first kind

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

${}_p\tilde{F}_q(a_1, \ldots, a_p; b_1, \ldots, b_q; z)$ is the regularized generalized hypergeometric function

$\mathbb{R}$ is the set of real numbers

Integral representations

$$\frac{2\sqrt{-2^2+(4+8)^2}}{4\sqrt{4\times 8}}-\frac{(4+8)^2\sqrt{-2^2+(4+8)^2}\,\sin^{-1}\left(\frac{\sqrt{-2+4+8}}{\sqrt{2}\,\sqrt{4+8}}\right)}{2\sqrt{-2+4+8}\,\sqrt{4\times 8\,(2+4+8)}}=$$
$$\frac{\sqrt{\frac{35}{2}}}{4}-3\sqrt{\frac{15}{2}}\int_0^1\frac{1}{\sqrt{1-\frac{5t^2}{12}}}\,dt$$

$$\frac{2\sqrt{-2^2+(4+8)^2}}{4\sqrt{4\times 8}}-\frac{(4+8)^2\sqrt{-2^2+(4+8)^2}\,\sin^{-1}\left(\frac{\sqrt{-2+4+8}}{\sqrt{2}\,\sqrt{4+8}}\right)}{2\sqrt{-2+4+8}\,\sqrt{4\times 8\,(2+4+8)}}=$$
$$\frac{\sqrt{\frac{35}{2}}}{4}+\frac{3\,i\sqrt{\frac{15}{2}}}{4\,\pi^{3/2}}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(\frac{12}{7}\right)^s\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)ds\quad\text{for } 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representation

$$\frac{2\sqrt{-2^2+(4+8)^2}}{4\sqrt{4\times 8}}-\frac{(4+8)^2\sqrt{-2^2+(4+8)^2}\,\sin^{-1}\left(\frac{\sqrt{-2+4+8}}{\sqrt{2}\,\sqrt{4+8}}\right)}{2\sqrt{-2+4+8}\,\sqrt{4\times 8\,(2+4+8)}}=$$
$$\frac{1}{4}\sqrt{\frac{35}{2}}\left(1-\frac{6}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-\frac{5}{6}\left\lfloor\frac{1+k}{2}\right\rfloor\left(-1+2\left\lfloor\frac{1+k}{2}\right\rfloor\right)}{1+2k}}\right)=$$
$$\frac{1}{4}\sqrt{\frac{35}{2}}\left(1-\frac{6}{1+-\frac{5}{6\left(3-\frac{5}{6\left(5-\frac{5}{7-\frac{5}{9+\cdots}}\right)}\right)}}\right)$$

$\lfloor x\rfloor$ is the floor function

$\mathop{\mathrm{K}}_{k=k_1}^{k_2} a_k / b_k$ is a continued fraction

From the two exact results

$$\frac{12\,i\,\sqrt{2}\,-16\,i\,\sqrt{\frac{2}{3}}\,\pi}{32\,\sqrt{3}}$$

and

$$\frac{\sqrt{\frac{35}{2}}}{4}-9\,\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)$$

(result in radians)

we obtain, after some calculations:

(((sqrt(35/2)/4 - 9 sqrt(2) sin^(-1)(sqrt(5/3)/2)))-(((12 i sqrt(2) - 16 i sqrt(2/3) π)/(32 sqrt(3))))-euler-mascheroni const*MRB const)^4-11

Input

$$\left(\left(\frac{\sqrt{\frac{35}{2}}}{4}-9\,\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)-\frac{12\,i\,\sqrt{2}\,-16\,i\,\sqrt{\frac{2}{3}}\,\pi}{32\,\sqrt{3}}-\gamma\,C_{\text{MRB}}\right)^4-11$$

$\sin^{-1}(x)$ is the inverse sine function

i is the imaginary unit

γ is the Euler-Mascheroni constant

C_{MRB} is the MRB constant

Exact result

$$-11+\left(-\gamma\, C_{\text{MRB}}+\frac{\sqrt{\frac{35}{2}}}{4}-\frac{12\,i\,\sqrt{2}-16\,i\,\sqrt{\frac{2}{3}}\,\pi}{32\sqrt{3}}-9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)^4$$

Decimal approximation

3999.357829058030506671053101480714197519046704217998261741067810…

$-$

884.637392061071290941687293862071177561869938661398920149548503 7…

i

(result in radians)

Alternate complex forms

$$\left(-11+\frac{\left(12\sqrt{2}-16\sqrt{\frac{2}{3}}\,\pi\right)^4}{9437184}-\right.$$

$$\frac{1}{512}\left(12\sqrt{2}-16\sqrt{\frac{2}{3}}\,\pi\right)^2\left(\frac{\sqrt{\frac{35}{2}}}{4}-\gamma C_{\text{MRB}}-9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)^2+$$

$$\left.\left(\frac{\sqrt{\frac{35}{2}}}{4}-\gamma C_{\text{MRB}}-9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)^4\right)+$$

$$\left(\frac{\left(12\sqrt{2}-16\sqrt{\frac{2}{3}}\,\pi\right)^3\left(\frac{\sqrt{\frac{35}{2}}}{4}-\gamma C_{\text{MRB}}-9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)}{24576\sqrt{3}}-\right.$$

$$\left.\frac{\left(12\sqrt{2}-16\sqrt{\frac{2}{3}}\,\pi\right)\left(\frac{\sqrt{\frac{35}{2}}}{4}-\gamma C_{\text{MRB}}-9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)^3}{8\sqrt{3}}\right)i$$

$$\sqrt{\left(\frac{1}{61\,917\,364\,224}\left(-8\,\gamma\,C_{\mathrm{MRB}}+\sqrt{70}-72\sqrt{2}\,\tan^{-1}\left(\sqrt{\frac{5}{7}}\right)\right)^2\right.}$$

$$\left(81\sqrt{2}\,\left(3\sqrt{3}-4\,\pi\right)\left(-8\,\gamma\,C_{\mathrm{MRB}}+\sqrt{70}-72\sqrt{2}\,\tan^{-1}\left(\sqrt{\frac{5}{7}}\right)\right)^2+\right.$$

$$\left.2\sqrt{6}\,\left(4\sqrt{3}\,\pi-9\right)^3\right)^2+$$

$$\left(\frac{\left(-27+24\sqrt{3}\,\pi-16\,\pi^2\right)\left(-8\,\gamma\,C_{\mathrm{MRB}}+\sqrt{70}-72\sqrt{2}\,\tan^{-1}\left(\sqrt{\frac{5}{7}}\right)\right)^2}{3072}+\right.$$

$$\left.\left(\gamma\,C_{\mathrm{MRB}}-\frac{\sqrt{\frac{35}{2}}}{4}+9\sqrt{2}\,\tan^{-1}\left(\sqrt{\frac{5}{7}}\right)\right)^4-11+\frac{\left(9-4\sqrt{3}\,\pi\right)^4}{746\,496}\right)^2\Bigg)$$

$$\exp\left(i\,\tan^{-1}\left(\left(\left(\frac{\left(12\sqrt{2}-16\sqrt{\frac{2}{3}}\,\pi\right)^3\left(-\gamma\,C_{\mathrm{MRB}}+\frac{\sqrt{\frac{35}{2}}}{4}-9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)}{24\,576\sqrt{3}}-\right.\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{\left(12\sqrt{2}-16\sqrt{\frac{2}{3}}\,\pi\right)\left(-\gamma\,C_{\mathrm{MRB}}+\frac{\sqrt{\frac{35}{2}}}{4}-9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)^3}{8\sqrt{3}}\right)\Big/\right.\right.\right.$$

$$\left.\left.\left(-\frac{1}{512}\left(12\sqrt{2}-16\sqrt{\frac{2}{3}}\,\pi\right)^2\left(-\gamma\,C_{\mathrm{MRB}}+\frac{\sqrt{\frac{35}{2}}}{4}-9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)^2+\right.\right.\right.$$

$$\left.\left.\left.\left(-\gamma\,C_{\mathrm{MRB}}+\frac{\sqrt{\frac{35}{2}}}{4}-9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)^4-\right.\right.\right.$$

$$\left.\left.\left.11+\frac{\left(12\sqrt{2}-16\sqrt{\frac{2}{3}}\,\pi\right)^4}{9\,437\,184}\right)\right)\right)\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Polar coordinates

$r \approx 4096$ (radius), $\theta \approx -0.21769$ (angle)

4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternate forms

$$-11 + \frac{\left(24\,\gamma\,C_{\text{MRB}} + \sqrt{2}\left(3\,i\,\sqrt{3} - 3\,\sqrt{35} - 4\,i\,\pi + 216\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)\right)^4}{331\,776}$$

$$-11+\left(-\gamma\, C_{\text{MRB}}+\frac{\sqrt{\frac{35}{2}}}{4}-\frac{12\,i\,\sqrt{2}-16\,i\,\sqrt{\frac{2}{3}}\,\pi}{32\sqrt{3}}-9\sqrt{2}\,\csc^{-1}\left(2\sqrt{\frac{3}{5}}\right)\right)^4$$

$$-11+\left(-\gamma\, C_{\text{MRB}}+\frac{\sqrt{\frac{35}{2}}}{4}-\frac{12\,i\,\sqrt{2}-16\,i\,\sqrt{\frac{2}{3}}\,\pi}{32\sqrt{3}}+9\,i\,\sqrt{2}\,\log\left(\frac{\sqrt{\frac{7}{3}}}{2}+\frac{1}{2}\,i\,\sqrt{\frac{5}{3}}\right)\right)^4$$

$\csc^{-1}(x)$ is the inverse cosecant function

$\log(x)$ is the natural logarithm

Expanded form

$$-\frac{2665}{256}-\frac{i\sqrt{105}}{8}+\frac{51}{16}i\sqrt{\frac{3}{2}}\,\gamma C_{\text{MRB}}-\frac{13}{16}\sqrt{\frac{35}{2}}\,\gamma C_{\text{MRB}}+6\gamma^2 {C_{\text{MRB}}}^2-$$
$$\frac{3}{8}i\sqrt{105}\,\gamma^2 {C_{\text{MRB}}}^2+i\sqrt{\frac{3}{2}}\,\gamma^3 {C_{\text{MRB}}}^3-\sqrt{\frac{35}{2}}\,\gamma^3 {C_{\text{MRB}}}^3+\gamma^4 {C_{\text{MRB}}}^4+$$
$$\frac{17\sqrt{3}\,\pi}{32}+\frac{13}{96}i\sqrt{35}\,\pi-2i\sqrt{2}\,\gamma C_{\text{MRB}}\,\pi-\frac{1}{4}\sqrt{\frac{105}{2}}\,\gamma C_{\text{MRB}}\,\pi+$$
$$\frac{1}{2}\sqrt{3}\,\gamma^2 {C_{\text{MRB}}}^2\pi+\frac{1}{2}i\sqrt{35}\,\gamma^2 {C_{\text{MRB}}}^2\pi-\frac{2}{3}i\sqrt{2}\,\gamma^3 {C_{\text{MRB}}}^3\pi-$$
$$\frac{\pi^2}{3}+\frac{1}{16}i\sqrt{\frac{35}{3}}\,\pi^2-\frac{i\gamma C_{\text{MRB}}\,\pi^2}{2\sqrt{6}}+\frac{1}{6}\sqrt{\frac{35}{2}}\,\gamma C_{\text{MRB}}\,\pi^2-$$
$$\frac{1}{3}\gamma^2 {C_{\text{MRB}}}^2\pi^2-\frac{\pi^3}{36\sqrt{3}}-\frac{1}{108}i\sqrt{35}\,\pi^3+\frac{1}{27}i\sqrt{2}\,\gamma C_{\text{MRB}}\,\pi^3+$$
$$\frac{\pi^4}{324}+\frac{459}{16}i\sqrt{3}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)-\frac{117}{16}\sqrt{35}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)+$$
$$108\sqrt{2}\,\gamma C_{\text{MRB}}\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)-\frac{27}{2}i\sqrt{\frac{105}{2}}\,\gamma C_{\text{MRB}}\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)+$$
$$27i\sqrt{3}\,\gamma^2 {C_{\text{MRB}}}^2\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)-27\sqrt{35}\,\gamma^2 {C_{\text{MRB}}}^2\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)+$$
$$36\sqrt{2}\,\gamma^3 {C_{\text{MRB}}}^3\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)-36i\pi\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)-\frac{9}{4}\sqrt{105}\,\pi\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)+$$
$$9\sqrt{6}\,\gamma C_{\text{MRB}}\,\pi\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)+9i\sqrt{70}\,\gamma C_{\text{MRB}}\,\pi\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)-$$
$$36i\gamma^2 {C_{\text{MRB}}}^2\pi\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)-\frac{3}{2}i\sqrt{3}\,\pi^2\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)+$$
$$\frac{3}{2}\sqrt{35}\,\pi^2\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)-6\sqrt{2}\,\gamma C_{\text{MRB}}\,\pi^2\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)+$$
$$\frac{2}{3}i\pi^3\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)+972\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^2-\frac{243}{4}i\sqrt{105}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^2+$$
$$243i\sqrt{6}\,\gamma C_{\text{MRB}}\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^2-243\sqrt{70}\,\gamma C_{\text{MRB}}\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^2+$$
$$972\gamma^2 {C_{\text{MRB}}}^2\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^2+81\sqrt{3}\,\pi\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^2+$$
$$81i\sqrt{35}\,\pi\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^2-324i\sqrt{2}\,\gamma C_{\text{MRB}}\,\pi\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^2-$$
$$54\pi^2\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^2+1458i\sqrt{3}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^3-1458\sqrt{35}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^3+$$
$$5832\sqrt{2}\,\gamma C_{\text{MRB}}\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^3-1944i\pi\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^3+26244\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)^4$$

27*sqrt((((sqrt(35/2)/4 - 9 sqrt(2) sin^(-1)(sqrt(5/3)/2)))-(((12 i sqrt(2) - 16 i sqrt(2/3) π)/(32 sqrt(3))))-euler-mascheroni const*MRB const)^4-11)+1

Input

$$27\sqrt{\left(\left(\frac{\sqrt{\frac{35}{2}}}{4}-9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)-\frac{12\,i\sqrt{2}-16\,i\sqrt{\frac{2}{3}}\,\pi}{32\sqrt{3}}-\gamma\,C_{\text{MRB}}\right)^4-11}+1$$

$\sin^{-1}(x)$ is the inverse sine function

i is the imaginary unit

γ is the Euler-Mascheroni constant

C_{MRB} is the MRB constant

Exact Result

$$1+27\sqrt{-11+\left(-\gamma\,C_{\text{MRB}}+\frac{\sqrt{\frac{35}{2}}}{4}-\frac{12\,i\sqrt{2}-16\,i\sqrt{\frac{2}{3}}\,\pi}{32\sqrt{3}}-9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)^4}$$

(result in radians)

Decimal approximation

1718.780014568704496665733696113819553115192636276409999489210064…

$-$

187.713401408515299027575307929488162776467327395769796610797584 3…

i

(result in radians)

Alternate complex forms

$1718.8 - 187.7\,i$

$1729\,(\cos(-0.10878) + i\sin(-0.10878))$

$1729\, e^{-0.10878\, i}$

Polar coordinates

$r = 1729.02$ (radius), $\theta = -0.108773$ (angle)

1729.02

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(27*sqrt((((sqrt(35/2)/4 - 9 sqrt(2) sin^(-1)(sqrt(5/3)/2)))-(((12 i sqrt(2) - 16 i sqrt(2/3) π)/(32 sqrt(3))))-euler-mascheroni const*MRB const)^4-11)+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\left(27\sqrt{\left(\left(\left(\frac{\sqrt{\frac{35}{2}}}{4}-9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)-\frac{12\,i\sqrt{2}-16\,i\sqrt{\frac{2}{3}}\,\pi}{32\sqrt{3}}-\gamma\,C_{\text{MRB}}\right)^4-11\right)+1}\right)^{\wedge}(1/15)+{C_{\text{MRB}}}^{1-1/(4\pi)+\pi}$$

$\sin^{-1}(x)$ is the inverse sine function

i is the imaginary unit

γ is the Euler-Mascheroni constant

C_{MRB} is the MRB constant

Exact Result

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi} + \left(1 + 27\sqrt{-11 + \left(-\gamma\, C_{\text{MRB}} + \frac{\sqrt{\frac{35}{2}}}{4} - \frac{12\,i\sqrt{2} - 16\,i\sqrt{\frac{2}{3}}\,\pi}{32\sqrt{3}} - 9\sqrt{2}\,\sin^{-1}\left(\frac{\sqrt{\frac{5}{3}}}{2}\right)\right)^4}\right)\text{^}(1/15)$$

(result in radians)

Decimal approximation

1.644894798440210662376219548158127050598913542589464661066645 1… −

0.011921066021491002782839434324691831940425588857053932667379658…

i

(result in radians)

Polar coordinates

$r = 1.644937995716175925871314032764830763137063726024725835204076 3$ (radius), $\theta = -0.007247185246864252328168708729176045003525628955806342710181318$ (angle)

1.6449379957…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Observations and conclusions

Electromagnetic phenomena accompany periods of earthquakes, and which at that time often take the place of telluric motions. In addition to this, they predominate every year during one or two months which chooses between March and May or, at the latest, enters June and July. **The activity of the sun is the center of electromagnetic phenomena** (Michele Stefano De Rossi – "Meteorologia Endogena")

Recall that tidal force (generally used in the plural, tidal forces or tidal forces, and also with the expression tidal effects) is a secondary effect of the **force of gravity**. Tidal effects from different bodies can add up, as in the case of the alignment between the Moon and the Sun which gives rise to intense syzygial tides.

The undoubted correlation that Prof. De Rossi felt between the Corleone earthquakes and those of Monte Baldo last year moved me to pay special attention to the latter as well. Rummaging through the scientific yearbooks, I found the precise dates of the strongest earthquakes felt in 1866 on the slopes of Monte Baldo, namely: 13 June, 11 August and 7-8 November, which correspond to the new moons; in 1870 seismic activity reawakened there, but I don't know the dates; in 1876 the first strong shock occurred on April 23, that is, on the eve of the new moon; with the perigee (which took place on the 26th) the shocks prepared by the new moon continued until the 29th; then the frequency decreased until May 4th and it already seemed to have left those populations in peace; except that the next coincidence of the new moon with the perigee and with a strong northern declination (in which position, as I already said, one of the two passages to the meridian is an energetic occasion for an earthquake) provided me with such a clue of awakening, probably on a greater extent of land , that here I prepared myself for careful surveillance, so as not to miss the most important phases of the phenomenon, when this happened. I mentioned this probability to Prof. Don Timoteo Bertelli of Florence in my letter of May 1st and to Prof. Goiran of Verona in a letter of the same 12th. The critical day otherwise passed peacefully in Trieste; not so in Monte Baldo, where the tremors resumed on the 22nd and continued on the 23rd, to be repeated on the 29th; at the same time in Corleone the activity, which had seemed almost extinguished since the 10th, was reawakened with a shock on the 20th, one on the 21st, four on the 24th and with great energy on the 25th. On May 22nd, the eve of the new moon, the very strong earthquake also occurred of Spoleto and at the time of the new moon in question there was, it can be said, no region of the Apennines in which seismic activity did not manifest itself with greater or lesser force, as can be seen from the bulletin.

In Monte Baldo there was a truce during June; in July the tremors resumed the day after the full moon and continued thereafter without interruption; in the following months tremors were noted on August 7th, September 5th, October 9th and November 4th, that is, almost always one or two days after the full moon. It is remarkable that on May 22nd and 23rd, while the rest of Italy was shaking, there was a truce in Corleone and then an immediate awakening, and the truce that occurred in the new moons following Monte Baldo in the face of energy is equally significant. manifested itself at the same time as Corleone, where the endogenous forces were transported by geological-mechanical effects, which it is not my task to erudite. In 1870, as far as I can remember, the seismic period of Monte Baldo put an end to that of Monte Nevoso (Julian Alps). This began on February 28th with a strong tremor at 12.20 pm; the next day the shocks were repeated and so also on the day of the new moon, March 2, and the following; after a fifteen-day truce a shock was felt at the full moon; then there were other tremors, the dates of which I could not know; those that came to my attention, and were the strongest, occurred on April 28th (the eve of the new moon), on May 10th, on May 15th (full moon), on June 2nd (near the new moon) and several between the 13th and the 19th. June (full moon period). Then the activity died down there and arose in Monte Baldo. Monte Nevoso was frequently subject to earthquakes; in relatively recent times there was a long period from November 1750 to May 1753; and in 1838 the populations remained in suspense for three months. That local area includes the city of Rijeka; and even in the small earthquakes, which occur here from time to time, I have observed a decided prevalence of syzygies. From this we see that some seismic periods, although limited within very narrow boundaries, can be the effect of a large telluric cause. I took the Corleone period into special consideration, because this is one of the few whose phases have been carefully studied and from which there is a sufficiently large number of shocks to draw positive consequences. There was another seismic period of recent memory and well studied, that of Belluno; the existing relationship between it and the lunar positions has no need of my demonstrations, because the illustrious Falb proved it since he predicted, based on his theories, the return of the phenomenon even during the course of the period itself.

Perhaps all the seismic phenomena that occur in Italy have as their cause, if not direct, at least determining, the action of the stars, but while on the one hand the lack of sufficient observations does not allow very extensive studies, on the other hand the translocation, which often happens, seismic centers distract the attention of investigators so as not to allow them to glimpse the effects of a great common cause in isolated phenomena.

It is desirable that the invitation made repeatedly by Prof. Cav. De Rossi, in order to obtain the greatest possible number of reports on seismic phenomena, must be listened to by those who have the progress of science at heart and that no one abstains from communicating even crude observations of such phenomena, the memory of which without this could be lost to the detriment of science. (**DELL' ATTRAZIONE LUNI- SOLARE IN RELAZIONE COI FENOMENI MAREO – SISMICI** - STUDI DIMOSTRATIVI DI GIULIO GRABLOVITZ – 1877)

In conclusion:

While **the activity of the sun is the center of electromagnetic phenomena,** the tidal force, hence the luni-solar attraction, is a secondary effect of the **force of gravity**. The **aurora borealis**, for example, is a phenomenon visually characterized by luminous bands that take on a wide range of shapes and colours, rapidly changing in time and space, usually red-green-blue in colour, called auroral arcs, caused from the interaction of charged particles (protons and electrons) of solar origin (solar wind) with the terrestrial ionosphere (atmosphere between 100-500 km): these particles excite the atoms of the atmosphere which, subsequently de-energizing, emit light of various lengths 'wave. Solar activity is a source of emission of **electromagnetic waves** and **electrically charged particles**, the luni-solar attraction, is a secondary effect of the **force of gravity**. It is therefore possible to hypothesize a connection, albeit indirect, between these phenomena and "**gravitational waves**" which, among other things, travel at a speed equal to c (speed of light), as well as **electromagnetic waves**. Thus, there is a purely mathematical connection between seismic waves and gravitational waves.

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

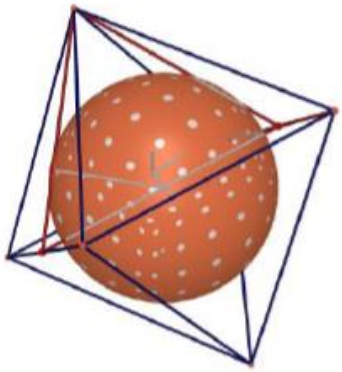


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\ l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.141939571526584308924330732196162632677513386811659044682541739 3

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$
$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

$4096 = 64^2$, (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$).

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$
for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.61805\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^8\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^8\right)^k}{k!}\right)\quad\text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$
$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi e^{0} \approx 3.1416$ (real, principal root)

$\pi e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1\sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003$ (real, principal root)

$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003$ (real root)

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\,\pi\left\lfloor\frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{8}{\pi^2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$n!$ is the factorial function

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$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.6180085459001070581002623979536005212943435960226956084921288971

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} =$$

$$\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} =$$

$$\sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\mathrm{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13

…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\Big/\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}\left(C\times \mathrm{R}\times 2.33\cdot 10^{-13}\right)}}\cong 1.61803398\ldots=\frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.618035912348264235440174408834709854254527350840173356306481810 7

…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\, x^2\, y\, z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$) is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.6018401361\times 10^{-24}\right)}}$$

1.618032997307532491506757016629746746422577260892967140791939590 3
…

1.6180329973075…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.4525642121\times 10^{-24}\right)}}$$

Result

1.644932352102092130483898983704151168876621841655166877914166033 8
…

1.64493235210209213…. ≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

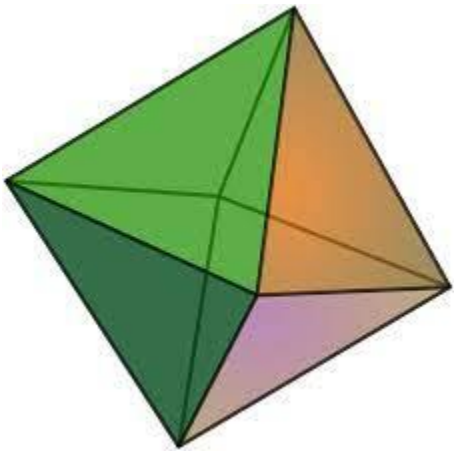
Result

3.14159225731469939950039231605796469731171781644423955790024797

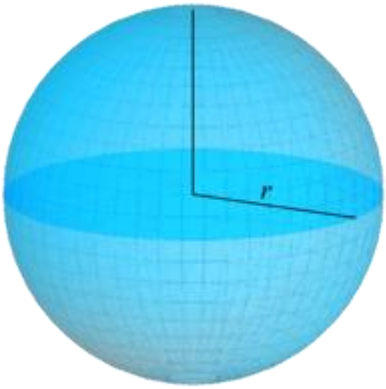
…

3.14159225731469…. ≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find a, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

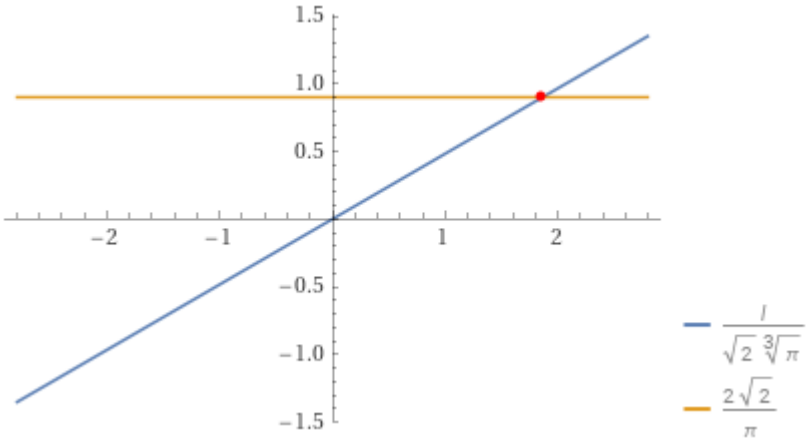
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,3}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

$1.64381856858\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\text{^}\,(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\wedge(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\wedge(1/15)\right)$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

$-5.010882647757...$

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+...}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+...}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\,\sqrt{6}}\right)^2\right\} = 0$$

$$\text{for } b = -\frac{226\,802\,245}{18\,480\,874}$$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

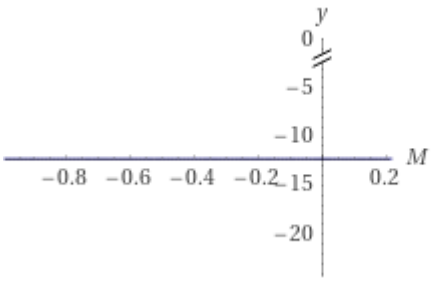
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

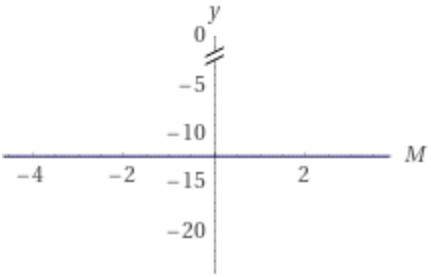
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V = \frac{1}{3}(0.0814845\,b + 1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

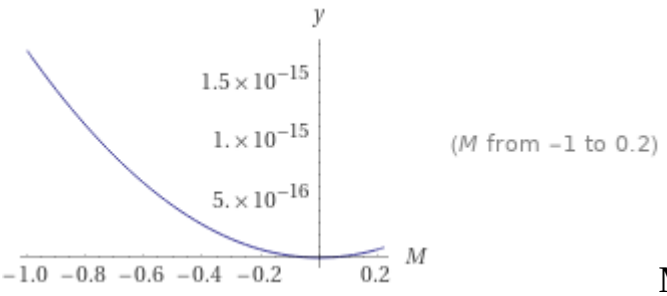
Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\,M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

Result:

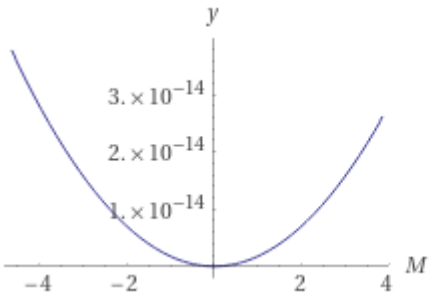
0

Plots: **(possible mathematical connection with an open string)**



M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(M from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O(M^{62194})$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{1}{3}M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2\left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^{-16}

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times 10^{-17}$

7.021621519159*10^{-17}

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

$1.57986484181*10^{-14}$

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 2^2 + 6.58545 \times 10^{-10}\sqrt{2^4}\right)}{2^2} + 1\right)^2 \times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_{0}}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)])))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\,\hat{}\,(1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

5.729475 * 10^{-35} Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

1.820306 * 10^{61} V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

5.975498*10^{-8} V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

1.042940*10^{27} V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

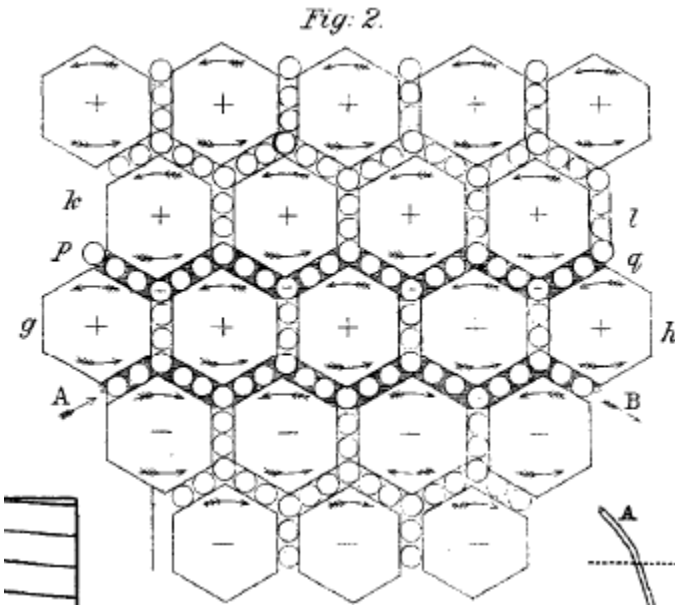
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

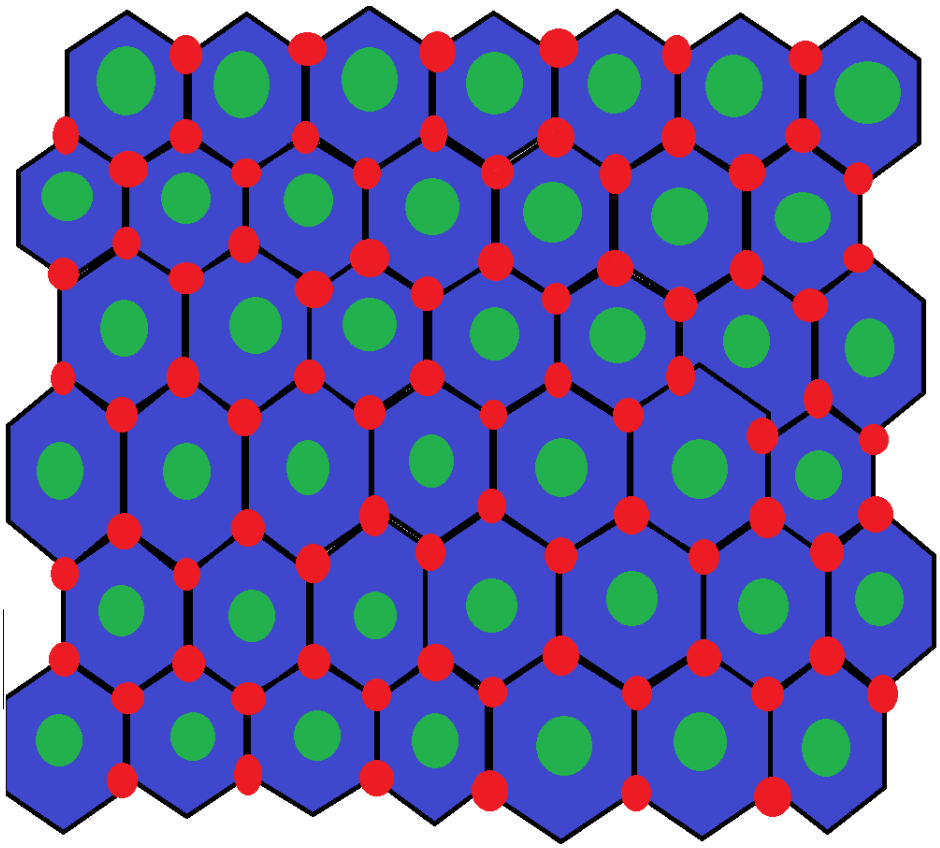
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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An Update on Brane Supersymmetry Breaking - *Jihad Mourad and Augusto Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On some equations concerning the seismology and the calculation relating to the tides and solar eclipses. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory X

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper (part X), we analyze some equations concerning the seismology and the calculation relating to the tides and solar eclipses. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory

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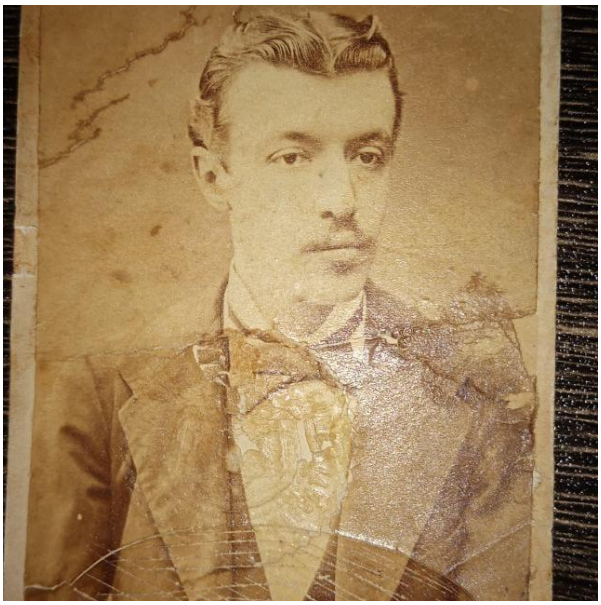
Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

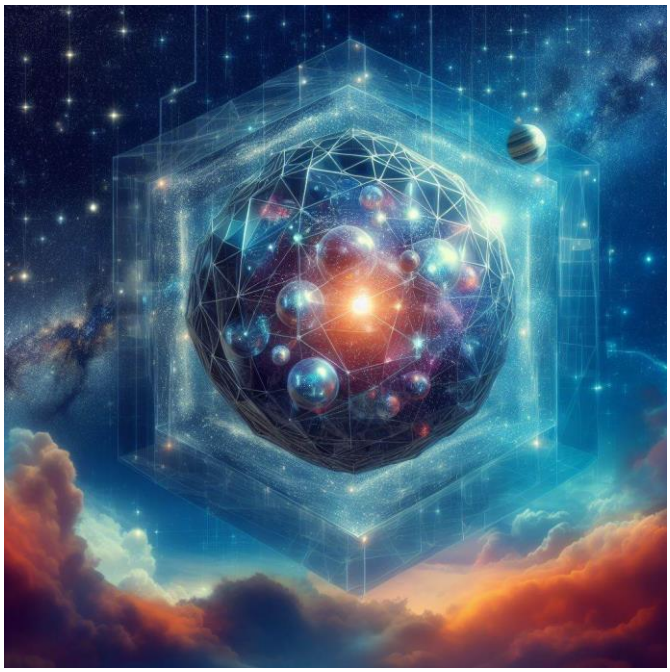
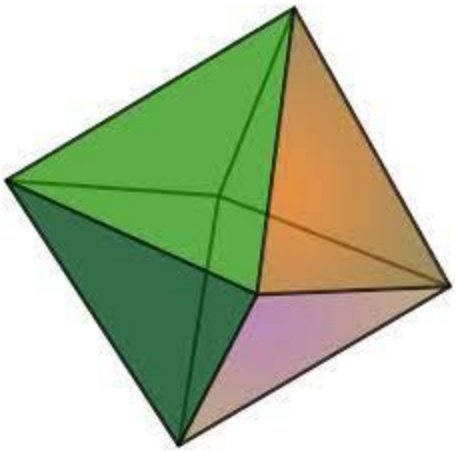
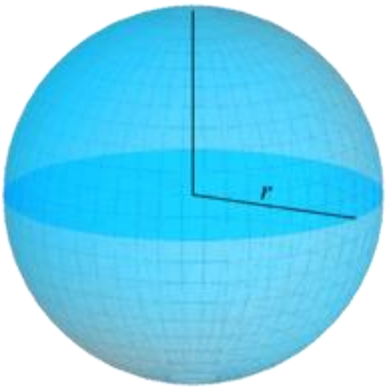


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\pi x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$l = 0, \quad x = 0$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt{2}\ \sqrt[3]{\pi}\right) = \log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\ \pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

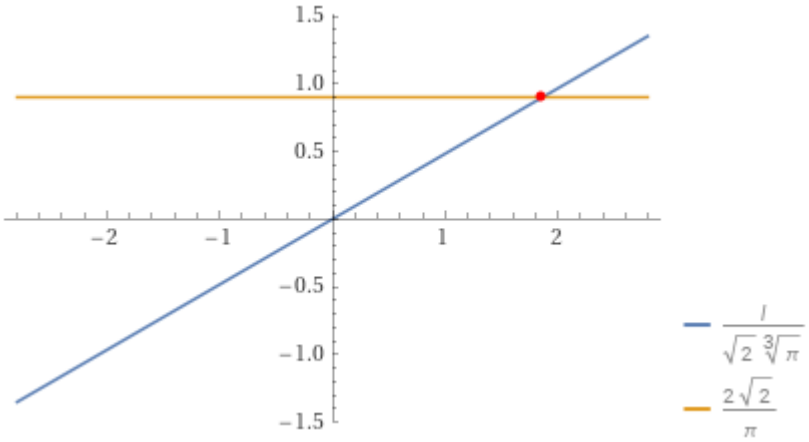
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

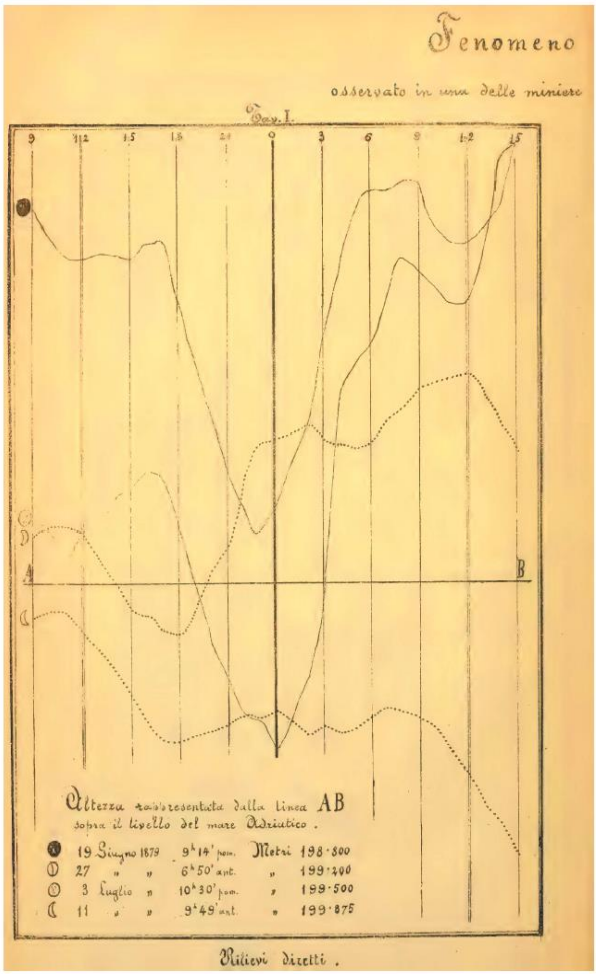
Plot

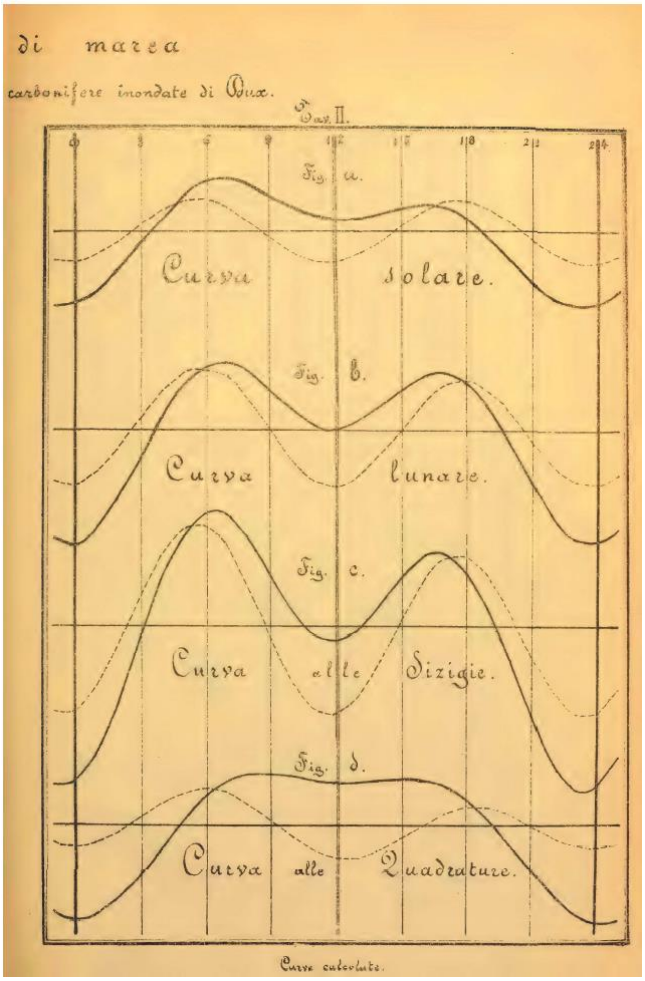


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

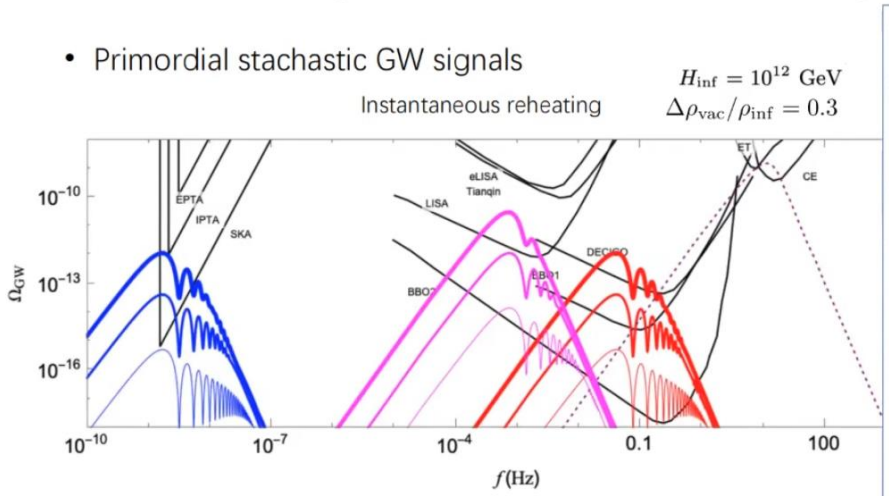

di marea
carbonifere inondate di Pux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

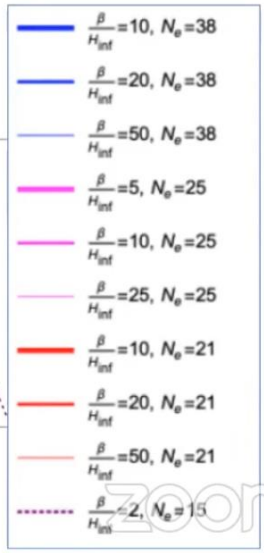
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

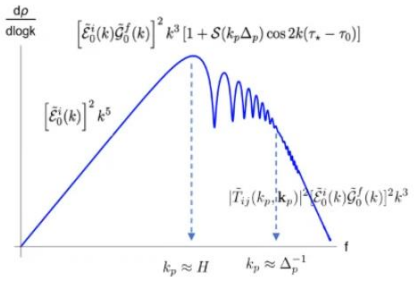
Comparison between primary GW and secondary GW

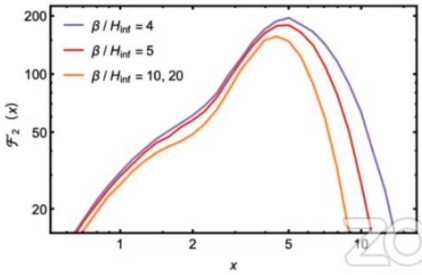
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





From

Umberto Forti – **Trigonometria**

We consider:

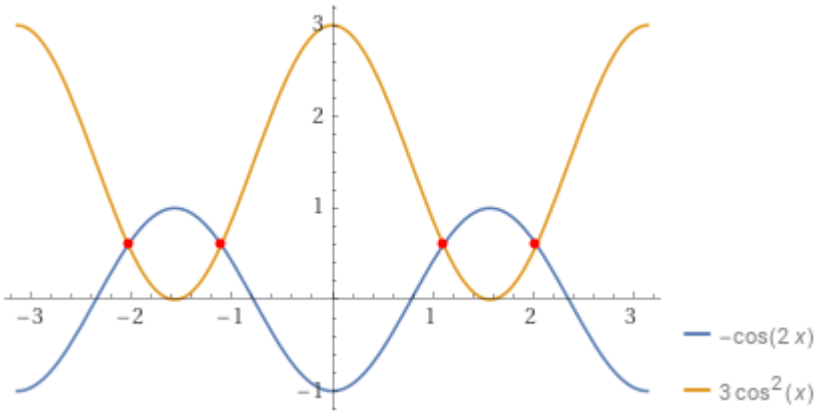
$$2\ \text{sen}^2\, x - 1 = 3 - 3\ \text{sen}^2\, x.$$

2 sin^2 x – 1 = 3 – 3 sin^2 x

Input

$$2\sin^2(x) - 1 = 3 - 3\sin^2(x)$$

Plot **(figures that can be related to the open strings)**



Alternate form assuming x is real

$$3\cos^2(x) + \cos(2x) = 0$$

Alternate forms

$$-\cos(2x) = 3\cos^2(x)$$

$$2\sin^2(x) - 1 = -3(\sin(x) - 1)(\sin(x) + 1)$$

$$-2\sin\left(\frac{\pi}{4} - x\right)\sin\left(x + \frac{\pi}{4}\right) = 3\cos^2(x)$$

Reduced trigonometric form

$$-\cos(2x) = \frac{1}{2}(3\cos(2x) + 3)$$

Expanded cosine form

$$1 - 2\cos^2(x) = 3\cos^2(x)$$

Solutions

$$x = 2\left(\pi n + \tan^{-1}\left(\frac{1}{2}\left(-1 - \sqrt{5}\right)\right)\right), \quad n \in \mathbb{Z}$$

$$x = 2\left(\pi n + \tan^{-1}\left(\frac{1}{2}\left(1 - \sqrt{5}\right)\right)\right), \quad n \in \mathbb{Z}$$

$$x = 2\left(\pi n + \tan^{-1}\left(\frac{1}{2}\left(\sqrt{5} - 1\right)\right)\right), \quad n \in \mathbb{Z}$$

$$x = 2\left(\pi n + \tan^{-1}\left(\frac{1}{2}\left(1 + \sqrt{5}\right)\right)\right), \quad n \in \mathbb{Z}$$

$\tan^{-1}(x)$ is the inverse tangent function

$\mathbb{Z}$ is the set of integers

From the following solution

$$x = 2\left(\pi n + \tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right), \quad n \in \mathbb{Z}$$

We consider:

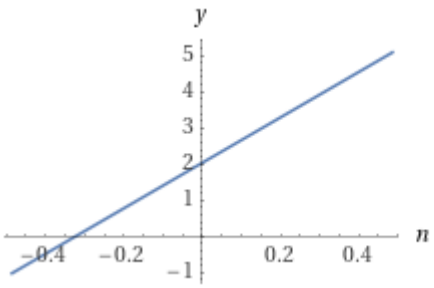
2 (n π + tan^(-1)(1/2 (1 + sqrt(5))))

Input

$$2\left(n\pi + \tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Plot



(n from −0.5 to 0.5)

Geometric figure

line

Expanded forms

$$2\pi n + 2\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)$$

$$2\pi n + 2\tan^{-1}\left(\frac{1}{2} + \frac{\sqrt{5}}{2}\right)$$

Alternate form

$$2\pi n - i\log\left(1+\frac{1}{2}i\left(1+\sqrt{5}\right)\right)+i\log\left(1-\frac{1}{2}i\left(1+\sqrt{5}\right)\right)$$

log(x) is the natural logarithm

Root

$$n=-\frac{\tan^{-1}\left(\frac{1}{2}+\frac{\sqrt{5}}{2}\right)}{\pi}$$

Derivative

$$\frac{d}{dn}\left(2\left(n\pi+\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)\right)=2\pi$$

Indefinite integral

$$\int 2\left(n\pi+\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)dn=2\left(\frac{\pi n^2}{2}+n\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)+\text{constant}$$

From the indefinite integral result

$$\int 2\left(n\pi+\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)dn=2\left(\frac{\pi n^2}{2}+n\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)+\text{constant}$$

we obtain:

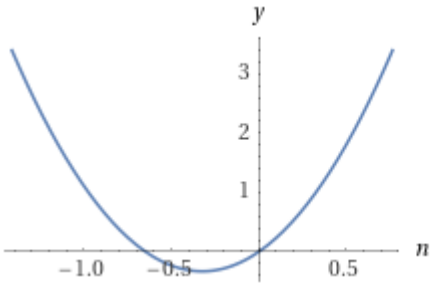
2 ((n^2 π)/2 + n tan^(-1)(1/2 (1 + sqrt(5))))

Input

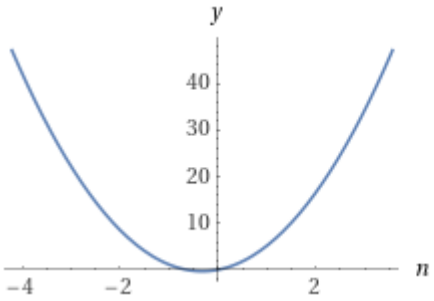
$$2\left(\frac{1}{2}\left(n^2\pi\right)+n\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Plots (figures that can be related to the open strings)



(n from −1.4 to 0.8)



(n from −4.2 to 3.6)

Geometric figure

parabola

Expanded forms

$$\pi n^2 + 2n \tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)$$

$$\pi n^2 + 2n \tan^{-1}\left(\frac{1}{2}+\frac{\sqrt{5}}{2}\right)$$

Alternate forms

$$\pi n^2 - i n \log\left(1+\frac{1}{2} i \left(1+\sqrt{5}\right)\right) + i n \log\left(1-\frac{1}{2} i \left(1+\sqrt{5}\right)\right)$$

$$\frac{\left(\pi n + \tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)^2}{\pi} - \frac{\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^2}{\pi}$$

$$n\left(\pi n + 2\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)$$

log(x) is the natural logarithm

Roots

$$n = 0$$

$$n = -\frac{2\tan^{-1}\left(\frac{1}{2}+\frac{\sqrt{5}}{2}\right)}{\pi}$$

Polynomial discriminant

$$\Delta_n = 4\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^2$$

Derivative

$$\frac{d}{dn}\left(2\left(\frac{n^2\pi}{2} + n\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)\right) = 2\left(\pi n + \tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)$$

Indefinite integral

$$\int 2\left(\frac{n^2\pi}{2} + n\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right) dn = \frac{\pi n^3}{3} + n^2\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right) + \text{constant}$$

Global minimum

$$\min\left\{2\left(\frac{n^2\pi}{2}+n\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)\right\}=-\frac{\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^2}{\pi}$$

$$\text{at } n=-\frac{\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)}{\pi}$$

Definite integral

$$\int_{-\frac{2\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)}{\pi}}^{0}2\left(\frac{n^2\pi}{2}+n\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)dn=$$

$$-\frac{4\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^3}{3\pi^2}\approx-0.142196$$

Definite integral area below the axis between the smallest and largest real roots

$$\int_{-\frac{2\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)}{\pi}}^{0}2\left(\frac{n^2\pi}{2}+n\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)\theta\left(-2\left(\frac{n^2\pi}{2}+n\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)\right)dn=-\frac{4\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^3}{3\pi^2}\approx-0.142196$$

$\theta(x)$ is the Heaviside step function

From the indefinite integral result

$$\int 2\left(\frac{n^2\pi}{2}+n\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)dn=\frac{\pi n^3}{3}+n^2\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)+\text{constant}$$

we obtain:

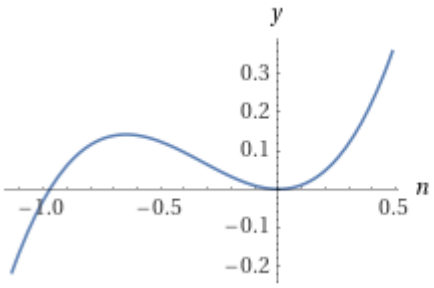
(n^3 π)/3 + n^2 tan^(-1)(1/2 (1 + sqrt(5)))

Input

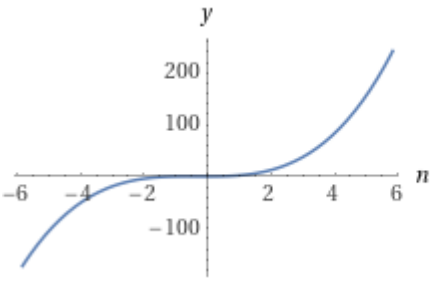
$$\frac{1}{3}\left(n^3\pi\right)+n^2\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Plots (figures that can be related to the open strings)



(n from −1.1 to 0.5)



(n from −5.8 to 5.8)

Alternate forms

$$n^2\left(\frac{\pi n}{3}+\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)$$

$$\frac{1}{3}n^2\left(\pi n+3\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)$$

$$\frac{\pi n^3}{3}-\frac{1}{2}in^2\log\left(1+\frac{1}{2}i\left(1+\sqrt{5}\right)\right)+\frac{1}{2}in^2\log\left(1-\frac{1}{2}i\left(1+\sqrt{5}\right)\right)$$

log(x) is the natural logarithm

Roots

$$n=0$$

$$n=-\frac{3\tan^{-1}\left(\frac{1}{2}+\frac{\sqrt{5}}{2}\right)}{\pi}$$

Polynomial discriminant

$$\Delta = 0$$

Derivative

$$\frac{d}{dn}\left(\frac{n^3\pi}{3} + n^2 \tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right) = n\left(\pi n + 2\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)$$

Indefinite integral

$$\int\left(\frac{n^3\pi}{3} + n^2 \tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)dn = \frac{1}{3}\left(\frac{\pi n^4}{4} + n^3 \tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right) + \text{constant}$$

Local maximum

$$\max\left\{\frac{n^3\pi}{3} + n^2 \tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right\} = \frac{4\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^3}{3\pi^2}$$

$$\text{at } n = -\frac{2\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)}{\pi}$$

Local minimum

$$\min\left\{\frac{n^3\pi}{3} + n^2 \tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right\} = 0 \text{ at } n = 0$$

Definite integral

$$\int_{-\frac{3\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)}{\pi}}^{0}\left(\frac{n^3\pi}{3} + n^2 \tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)dn =$$

$$\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3} \approx 0.0776955$$

Definite integral area above the axis between the smallest and largest real roots

$$\int_{-\frac{3\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)}{\pi}}^{0}\left(\frac{n^3\pi}{3}+n^2\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)\theta\left(\frac{n^3\pi}{3}+n^2\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)dn = \frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3} \approx 0.0776955$$

$\theta(x)$ is the Heaviside step function

From the definite integral area above the axis between the smallest and largest real roots

$$\int_{-\frac{3\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)}{\pi}}^{0}\left(\frac{n^3\pi}{3}+n^2\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)\theta\left(\frac{n^3\pi}{3}+n^2\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)\right)dn = \frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3} \approx 0.0776955$$

(((9 tan^(-1)(1/2 (1 + sqrt(5)))^4)/(4 π^3)))

after some calculations, we obtain:

(16+1/√2)(8*1/(((9 tan^(-1)(1/2 (1 + sqrt(5)))^4)/(4 π^3))))+8+1/√2

Input

$$\left(16+\frac{1}{\sqrt{2}}\right)\left(8\times\frac{1}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}\right)+8+\frac{1}{\sqrt{2}}$$

$\tan^{-1}(x)$ is the inverse tangent function

Exact Result

$$8+\frac{1}{\sqrt{2}}+\frac{32\left(16+\frac{1}{\sqrt{2}}\right)\pi^3}{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}$$

(result in radians)

Decimal approximation

1728.972342245226387201056477648090935442793496749590428893297279 8

…

(result in radians)

1728.972342245….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry.

Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternate forms

$$8+\frac{1}{\sqrt{2}}+\frac{\left(\frac{512}{9}+\frac{16\sqrt{2}}{9}\right)\pi^3}{\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}$$

$$\frac{1}{2}\left(16+\sqrt{2}\right)+\frac{16\left(32+\sqrt{2}\right)\pi^3}{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}$$

$$\frac{1}{2}\left(16+\sqrt{2}\right)+\frac{\left(512+16\sqrt{2}\right)\pi^3}{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}$$

Expanded forms

$$8+\frac{1}{\sqrt{2}}+\frac{512\,\pi^3}{9\tan^{-1}\left(\frac{1}{2}+\frac{\sqrt{5}}{2}\right)^4}+\frac{16\sqrt{2}\,\pi^3}{9\tan^{-1}\left(\frac{1}{2}+\frac{\sqrt{5}}{2}\right)^4}$$

$$8+\frac{1}{\sqrt{2}}+\frac{512\,\pi^3}{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}+\frac{16\sqrt{2}\,\pi^3}{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}$$

Alternative representations

$$\frac{\left(16+\frac{1}{\sqrt{2}}\right)8}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}+8+\frac{1}{\sqrt{2}}=8+\frac{1}{\sqrt{2}}+\frac{8\left(16+\frac{1}{\sqrt{2}}\right)}{\frac{9\,\mathrm{sc}^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\middle|0\right)^4}{4\pi^3}}$$

$$\frac{\left(16+\frac{1}{\sqrt{2}}\right)8}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}+8+\frac{1}{\sqrt{2}}=8+\frac{1}{\sqrt{2}}+\frac{8\left(16+\frac{1}{\sqrt{2}}\right)}{\frac{9\tan^{-1}\left(1,\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}$$

$$\frac{\left(16+\frac{1}{\sqrt{2}}\right)8}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}+8+\frac{1}{\sqrt{2}}=8+\frac{1}{\sqrt{2}}+\frac{8\left(16+\frac{1}{\sqrt{2}}\right)}{\frac{9\cot^{-1}\left(\frac{1}{\frac{1}{2}\left(1+\sqrt{5}\right)}\right)^4}{4\pi^3}}$$

$\mathrm{sc}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function sc

$\tan^{-1}(x, y)$ is the inverse tangent function

$\cot^{-1}(x)$ is the inverse cotangent function

Series representations

$$\frac{\left(16+\frac{1}{\sqrt{2}}\right)8}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}+8+\frac{1}{\sqrt{2}}=8+\frac{1}{\sqrt{2}}+\frac{256\left(32+\sqrt{2}\right)\pi^3}{9\left(\pi-2\sum_{k=0}^{\infty}\frac{(-1)^k\,2^{1+2k}\left(1+\sqrt{5}\right)^{-1-2k}}{1+2k}\right)^4}$$

$$\frac{\left(16+\frac{1}{\sqrt{2}}\right)8}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}+8+\frac{1}{\sqrt{2}}=8+\frac{1}{\sqrt{2}}+\frac{32\left(16+\frac{1}{\sqrt{2}}\right)\pi^3}{9\left(\frac{\pi}{2}-\sum_{k=0}^{\infty}\frac{(-1)^k\,2^{1+2k}\left(1+\sqrt{5}\right)^{-1-2k}}{1+2k}\right)^4}$$

$$\frac{\left(16+\frac{1}{\sqrt{2}}\right)8}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}+8+\frac{1}{\sqrt{2}}=$$

$$8+\frac{1}{\sqrt{2}}+\frac{256\left(32+\sqrt{2}\right)\pi^3}{9\left(\log\left(\frac{1}{4}\left((2+i)+i\sqrt{5}\right)\right)+\sum_{k=1}^{\infty}\frac{\left(\frac{1}{4}\left((2+i)+i\sqrt{5}\right)\right)^k}{k}\right)^4}$$

log(x) is the natural logarithm

Integral representations

$$\frac{\left(16+\frac{1}{\sqrt{2}}\right)8}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}+8+\frac{1}{\sqrt{2}}=8+\frac{1}{\sqrt{2}}+\frac{16\left(32+\sqrt{2}\right)\pi^3}{9\left(1+\sqrt{5}\right)^4\left(\int_0^1\frac{1}{2+\left(3+\sqrt{5}\right)t^2}\,dt\right)^4}$$

$$\frac{\left(16+\frac{1}{\sqrt{2}}\right)8}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}+8+\frac{1}{\sqrt{2}}=$$

$$8+\frac{1}{\sqrt{2}}+\frac{131\,072\left(16+\frac{1}{\sqrt{2}}\right)\pi^9}{9\left(1+\sqrt{5}\right)^4\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\left(1+\frac{1}{4}\left(1+\sqrt{5}\right)^2\right)^{-s}\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)^2\,ds\right)^4}$$

for $0<\gamma<\frac{1}{2}$

$$\frac{\left(16+\frac{1}{\sqrt{2}}\right)8}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}+8+\frac{1}{\sqrt{2}}=$$

$$8+\frac{1}{\sqrt{2}}+\frac{65\,536\left(32+\sqrt{2}\right)\pi^7}{9\left(1+\sqrt{5}\right)^4\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{4^s\left(1+\sqrt{5}\right)^{-2s}\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds\right)^4}\quad\text{for } 0<\gamma<\frac{1}{2}$$

Γ(x) is the gamma function

Continued fraction representations

$$\frac{\left(16+\frac{1}{\sqrt{2}}\right)8}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}+8+\frac{1}{\sqrt{2}}=8+\frac{1}{\sqrt{2}}+\frac{256\left(32+\sqrt{2}\right)\pi^3\left(1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{1}{2}(3+\sqrt{5})k^2}{1+2k}\right)^4}{9\left(1+\sqrt{5}\right)^4}=$$

$$8+\frac{1}{\sqrt{2}}+\frac{256\left(32+\sqrt{2}\right)\pi^3\left(1+\cfrac{3+\sqrt{5}}{2\left(3+\cfrac{2\left(3+\sqrt{5}\right)}{5+\cfrac{9\left(3+\sqrt{5}\right)}{2\left(7+\cfrac{8\left(3+\sqrt{5}\right)}{9+\ldots}\right)}}\right)}\right)^4}{9\left(1+\sqrt{5}\right)^4}$$

$$\frac{\left(16+\frac{1}{\sqrt{2}}\right)8}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}+8+\frac{1}{\sqrt{2}}=$$

$$8+\frac{1}{\sqrt{2}}+\frac{256\left(32+\sqrt{2}\right)\pi^3\left(1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{1}{2}\left(3+\sqrt{5}\right)(1-2k)^2}{\frac{1}{2}\left(5+\sqrt{5}-2\left(1+\sqrt{5}\right)k\right)}\right)^4}{9\left(1+\sqrt{5}\right)^4}=$$

$$8+\frac{1}{\sqrt{2}}+\frac{1}{9\left(1+\sqrt{5}\right)^4}$$

$$256\left(32+\sqrt{2}\right)\pi^3\left(1+\left(3+\sqrt{5}\right)\Big/\left(2\left(\frac{1}{2}\left(5+\sqrt{5}-2\left(1+\sqrt{5}\right)\right)+\left(9\left(3+\sqrt{5}\right)\right)\Big/\left(2\left(\frac{1}{2}\left(5+\sqrt{5}-4\left(1+\sqrt{5}\right)\right)+\left(25\left(3+\sqrt{5}\right)\right)\Big/\left(2\left(\frac{1}{2}\left(5+\sqrt{5}-6\left(1+\sqrt{5}\right)\right)+\frac{49\left(3+\sqrt{5}\right)}{2\left(\frac{1}{2}\left(5+\sqrt{5}-8\left(1+\sqrt{5}\right)\right)+\ldots\right)}\right)\right)\right)\right)\right)\right)^4$$

$$\frac{\left(16+\frac{1}{\sqrt{2}}\right)8}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}+8+\frac{1}{\sqrt{2}}=$$

$$8+\frac{1}{\sqrt{2}}+\frac{131\,072\left(16+\frac{1}{\sqrt{2}}\right)\pi^3}{9\left(1+\sqrt{5}\right)^4\left(4-\frac{2\left(3+\sqrt{5}\right)}{3+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{1}{2}\left(3+\sqrt{5}\right)\left(1+(-1)^{1+k}+k\right)^2}{3+2\,k}}\right)^4}=$$

$$8+\frac{1}{\sqrt{2}}+\frac{131\,072\left(16+\frac{1}{\sqrt{2}}\right)\pi^3}{9\left(1+\sqrt{5}\right)^4\left(4-\frac{2\left(3+\sqrt{5}\right)}{3+\frac{9\left(3+\sqrt{5}\right)}{2\left(5+\frac{2\left(3+\sqrt{5}\right)}{7+\frac{25\left(3+\sqrt{5}\right)}{2\left(9+\frac{8\left(3+\sqrt{5}\right)}{11+\ldots}\right)}}\right)}}\right)^4}$$

$\underset{k=k_1}{\overset{k_2}{\mathrm{K}}}\ a_k\,/\,b_k$ is a continued fraction

(1/27(((16+1/√2)(8*1/(((9 tan^(-1)(1/2 (1 + sqrt(5)))^4)/(4 π^3))))+8+1/√2)-1))^2+4/5*MRB const

Input

$$\left(\frac{1}{27}\left(\left(\left(16+\frac{1}{\sqrt{2}}\right)\left(8\times\frac{1}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}\right)+8+\frac{1}{\sqrt{2}}\right)-1\right)\right)^2+\frac{4}{5}\,C_{\mathrm{MRB}}$$

$\tan^{-1}(x)$ is the inverse tangent function

C_{MRB} is the MRB constant

Exact result

$$\frac{4\,C_{\text{MRB}}}{5}+\frac{1}{729}\left(7+\frac{1}{\sqrt{2}}+\frac{32\left(16+\frac{1}{\sqrt{2}}\right)\pi^3}{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}\right)^2$$

Decimal approximation

4096.019170518433018969385033951313606959501887768030674310987258 4

…

(result in radians)

4096.019170518433…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Expanded forms

$$\frac{4\,C_{\text{MRB}}}{5}+\frac{11}{162}+\frac{7\sqrt{2}}{729}+\frac{9728\,\pi^6}{2187\tan^{-1}\left(\frac{1}{2}+\frac{\sqrt{5}}{2}\right)^8}+\frac{16384\sqrt{2}\,\pi^6}{59049\tan^{-1}\left(\frac{1}{2}+\frac{\sqrt{5}}{2}\right)^8}+\frac{800\,\pi^3}{729\tan^{-1}\left(\frac{1}{2}+\frac{\sqrt{5}}{2}\right)^4}+\frac{736\sqrt{2}\,\pi^3}{6561\tan^{-1}\left(\frac{1}{2}+\frac{\sqrt{5}}{2}\right)^4}$$

$$\frac{4\,C_{\text{MRB}}}{5}+\frac{11}{162}+\frac{7\sqrt{2}}{729}+\frac{9728\,\pi^6}{2187\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^8}+\frac{16384\sqrt{2}\,\pi^6}{59049\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^8}+\frac{800\,\pi^3}{729\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}+\frac{736\sqrt{2}\,\pi^3}{6561\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}$$

Alternate forms

$$\frac{4\,C_{\text{MRB}}}{5}+\frac{1}{729}\left(\frac{1}{2}\left(14+\sqrt{2}\right)+\frac{\left(512+16\sqrt{2}\right)\pi^3}{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}\right)^2$$

$$\frac{4\,C_{\text{MRB}}}{5}+\frac{\left(32\left(1+16\sqrt{2}\right)\pi^3+9\left(1+7\sqrt{2}\right)\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4\right)^2}{118098\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^8}$$

$$\frac{4\,C_{\text{MRB}}}{5}+\frac{1}{729}\left(7+\frac{1}{\sqrt{2}}+\frac{512\left(16+\frac{1}{\sqrt{2}}\right)\pi^3}{9\left(\log\left(1-\frac{1}{2}\,i\left(1+\sqrt{5}\right)\right)-\log\left(1+\frac{1}{2}\,i\left(1+\sqrt{5}\right)\right)\right)^4}\right)^2$$

$\log(x)$ is the natural logarithm

((16+1/√2)(8*1/(((9 tan^(-1)(1/2 (1 + sqrt(5)))^4)/(4 π^3))))+8+1/√2)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{\left(16+\frac{1}{\sqrt{2}}\right)\left(8\times\frac{1}{\frac{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}{4\pi^3}}\right)+8+\frac{1}{\sqrt{2}}}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

$\tan^{-1}(x)$ is the inverse tangent function

C_{MRB} is the MRB constant

Exact result

$$C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}+\sqrt[15]{8+\frac{1}{\sqrt{2}}+\frac{32\left(16+\frac{1}{\sqrt{2}}\right)\pi^3}{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}}$$

Decimal approximation

1.644936271110098968569781575859532150429879103984249738401632558 6

…

(result in radians)

1.64493627111…. ≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}+\sqrt[15]{\frac{1}{2}\left(16+\sqrt{2}\right)+\frac{\left(512+16\sqrt{2}\right)\pi^3}{9\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right)^4}}$$

$$C_{\text{MRB}}^{1-1/(4\pi)+\pi} + \sqrt[15]{8 + \frac{1}{\sqrt{2}} + \frac{512\left(16 + \frac{1}{\sqrt{2}}\right)\pi^3}{9\left(\tan^{-1}\left(\frac{1}{2}\left(1+\sqrt{5}\right)\right) - \tan^{-1}\left(\frac{1}{2}\left(-1-\sqrt{5}\right)\right)\right)^4}}$$

$$C_{\text{MRB}}^{1-1/(4\pi)+\pi} + \sqrt[15]{8 + \frac{1}{\sqrt{2}} + \frac{512\left(16 + \frac{1}{\sqrt{2}}\right)\pi^3}{9\left(\log\left(1 - \frac{1}{2}i\left(1+\sqrt{5}\right)\right) - \log\left(1 + \frac{1}{2}i\left(1+\sqrt{5}\right)\right)\right)^4}}$$

log(x) is the natural logarithm

We analyze the following equation:

$$\frac{1}{2\cos x} = \sqrt{3} \cdot \cot x.$$

We consider:

(1/(2 cos x)) = √3 * cotan x

Input

$$\frac{1}{2\cos(x)} = \sqrt{3}\,\cot(x)$$

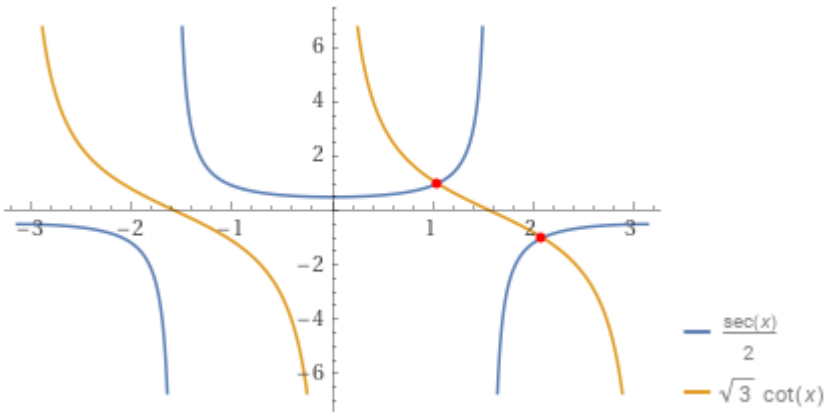
cot(x) is the cotangent function

Exact result

$$\frac{\sec(x)}{2} = \sqrt{3}\,\cot(x)$$

sec(x) is the secant function

Plot (figures that can be related to the open strings)



Alternate forms assuming x is real

$$2\sqrt{3}\,\cot(x) = \sec(x)$$

$$\frac{\cos(x)}{\cos(2x)+1} = -\frac{\sqrt{3}\,\sin(2x)}{\cos(2x)-1}$$

Alternate forms

$$\frac{1}{2\cos(x)} = \frac{\sqrt{3}\,\cos(x)}{\sin(x)}$$

$$\frac{1}{e^{-ix}+e^{ix}} = -\frac{i\sqrt{3}\,\left(e^{-ix}+e^{ix}\right)}{e^{-ix}-e^{ix}}$$

Real solutions

$$x = \frac{2}{3}(3\pi n+\pi)\,, \quad n \in \mathbb{Z}$$

$$x = \frac{1}{3}(6\pi n+\pi)\,, \quad n \in \mathbb{Z}$$

$\mathbb{Z}$ is the set of integers

Solutions

$$x = 2\pi n + 2\tan^{-1}\left(\frac{1}{2}\left(-\sqrt{3} + -i\right)\right), \quad n \in \mathbb{Z}$$

$$x = 2\pi n + 2\tan^{-1}\left(\frac{1}{2}\left(-\sqrt{3} + i\right)\right), \quad n \in \mathbb{Z}$$

$$x = \frac{1}{3}(6\pi n + \pi), \quad n \in \mathbb{Z}$$

$$x = \frac{1}{3}(6\pi n + 2\pi), \quad n \in \mathbb{Z}$$

$\tan^{-1}(x)$ is the inverse tangent function

From the solution

$$x = 2\pi n + 2\tan^{-1}\left(\frac{1}{2}\left(-\sqrt{3} + i\right)\right), \quad n \in \mathbb{Z}$$

we obtain:

2 n π + 2 tan^(-1)(1/2 (i - sqrt(3)))

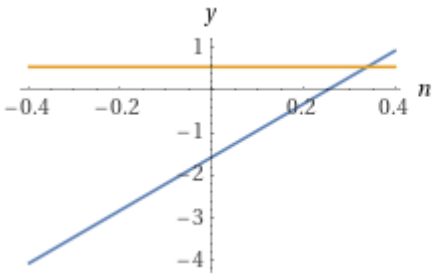
Input

$$2n\pi + 2\tan^{-1}\left(\frac{1}{2}\left(i - \sqrt{3}\right)\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

i is the imaginary unit

Plot



(*n* from −0.4 to 0.4)

real part
imaginary part

Alternate forms

$$2\left(\pi n+\tan^{-1}\left((-1)^{5/6}\right)\right)$$

$$2\pi n+2\tan^{-1}\left((-1)^{5/6}\right)$$

$$2\left(\pi n+\tan^{-1}\left(\frac{1}{2}\left(-\sqrt{3}+i\right)\right)\right)$$

Alternate form assuming n is real

$$2\pi n-\frac{\pi}{2}+\frac{1}{2}i\log(3)$$

log(*x*) is the natural logarithm

Complex root

$$n=\frac{1}{4}-\frac{i\log(3)}{4\pi}$$

Derivative

$$\frac{d}{dn}\left(2n\pi+2\tan^{-1}\left(\frac{1}{2}\left(i-\sqrt{3}\right)\right)\right)=2\pi$$

Indefinite integral

$$\int\left(2n\pi+2\tan^{-1}\left(\frac{1}{2}\left(i-\sqrt{3}\right)\right)\right)dn=2\left(\frac{\pi n^2}{2}+n\tan^{-1}\left((-1)^{5/6}\right)\right)+\text{constant}$$

From the indefinite integral result

$$\int\left(2n\pi+2\tan^{-1}\left(\frac{1}{2}\left(i-\sqrt{3}\right)\right)\right)dn=2\left(\frac{\pi n^2}{2}+n\tan^{-1}\left((-1)^{5/6}\right)\right)+\text{constant}$$

we obtain:

2 ((n^2 π)/2 + n tan^(-1)((-1)^(5/6)))

Input

$$2\left(\frac{1}{2}\left(n^2\pi\right)+n\tan^{-1}\left((-1)^{5/6}\right)\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Expanded form

$$\pi n^2+2n\tan^{-1}\left((-1)^{5/6}\right)$$

Alternate form assuming n>0

$$\pi n^2+2n\tan^{-1}\left(e^{(5i\pi)/6}\right)$$

Alternate form assuming n is real

$$\pi n^2-\frac{\pi n}{2}+\frac{1}{2}in\log(3)$$

$\log(x)$ is the natural logarithm

Alternate forms

$$\pi n^2 - \frac{\pi n}{3} + i n \log\left(1 + \sqrt[3]{-1}\right)$$

$$\frac{\left(\pi n + \tan^{-1}\left((-1)^{5/6}\right)\right)^2}{\pi} - \frac{\tan^{-1}\left((-1)^{5/6}\right)^2}{\pi}$$

$$n\left(\pi n + 2\tan^{-1}\left((-1)^{5/6}\right)\right)$$

Real root

$n = 0$ (assuming a complex-valued 6^{th} root)

Complex root

$$n = \frac{1}{2} - \frac{i \log(3)}{2\pi}$$

Polynomial discriminant

$$\Delta_n = 4\tan^{-1}\left((-1)^{5/6}\right)^2$$

Derivative

$$\frac{d}{dn}\left(2\left(\frac{n^2\pi}{2} + n\tan^{-1}\left((-1)^{5/6}\right)\right)\right) = 2\left(\pi n + \tan^{-1}\left((-1)^{5/6}\right)\right)$$

Indefinite integral

$$\int 2\left(\frac{n^2\pi}{2} + n\tan^{-1}\left((-1)^{5/6}\right)\right) dn = \frac{\pi n^3}{3} + n^2\tan^{-1}\left((-1)^{5/6}\right) + \text{constant}$$

From the indefinite integral result

$$\int 2\left(\frac{n^2\,\pi}{2} + n\tan^{-1}\left((-1)^{5/6}\right)\right)dn = \frac{\pi\,n^3}{3} + n^2\tan^{-1}\left((-1)^{5/6}\right) + \text{constant}$$

we obtain:

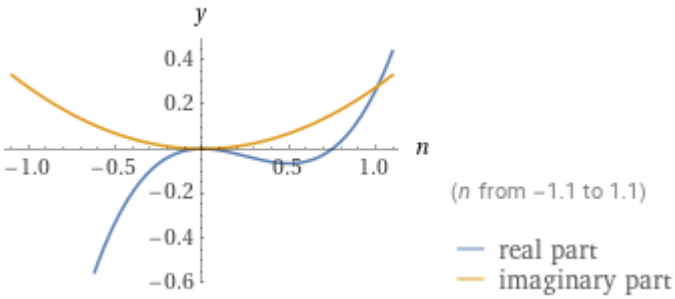
(n^3 π)/3 + n^2 tan^(-1)((-1)^(5/6))

Input

$$\frac{1}{3}\left(n^3\,\pi\right) + n^2\tan^{-1}\left((-1)^{5/6}\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Plot **(figures that can be related to the open strings)**



Alternate form assuming n>0

$$\frac{\pi\,n^3}{3} + n^2\tan^{-1}\left(e^{(5\,i\,\pi)/6}\right)$$

Alternate form assuming n is real

$$\frac{\pi\,n^3}{3} - \frac{\pi\,n^2}{4} + \frac{1}{4}\,i\,n^2\log(3)$$

log(x) is the natural logarithm

Alternate forms

$$n^2\left(\frac{\pi n}{3}+\tan^{-1}\left((-1)^{5/6}\right)\right)$$

$$\frac{1}{3}n^2\left(\pi n+3\tan^{-1}\left((-1)^{5/6}\right)\right)$$

$$\frac{\pi n^3}{3}-\frac{\pi n^2}{6}+\frac{1}{2}i n^2\log\left(1+\sqrt[3]{-1}\right)$$

Real root

$n=0$ (assuming a complex-valued 6^{th} root)

Complex root

$$n=\frac{3}{4}-\frac{3i\log(3)}{4\pi}$$

Polynomial discriminant

$$\Delta=0$$

Derivative

$$\frac{d}{dn}\left(\frac{n^3\pi}{3}+n^2\tan^{-1}\left((-1)^{5/6}\right)\right)=n\left(\pi n+2\tan^{-1}\left((-1)^{5/6}\right)\right)$$

Indefinite integral

$$\int\left(\frac{n^3\pi}{3}+n^2\tan^{-1}\left((-1)^{5/6}\right)\right)dn=\frac{1}{3}\left(\frac{\pi n^4}{4}+n^3\tan^{-1}\left((-1)^{5/6}\right)\right)+\text{constant}$$

From the indefinite integral result

$$\int\left(\frac{n^3\,\pi}{3}+n^2\tan^{-1}\left((-1)^{5/6}\right)\right)dn=\frac{1}{3}\left(\frac{\pi\,n^4}{4}+n^3\tan^{-1}\left((-1)^{5/6}\right)\right)+\text{constant}$$

1/3 ((n^4 π)/4 + n^3 tan^(-1)((-1)^(5/6)))

for n = 8:

1/3 ((8^4 π)/4 + 8^3 tan^(-1)((-1)^(5/6)))

Input

$$\frac{1}{3}\left(\frac{1}{4}\left(8^4\,\pi\right)+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Exact Result

$$\frac{1}{3}\left(1024\,\pi+512\tan^{-1}\left((-1)^{5/6}\right)\right)$$

(result in radians)

Decimal approximation

938.289005872151580554176157139478194746887927280031605197850118 2…

$+$

46.874124316506013499530463442027763398292930467103976607346958 23…

i

(result in radians)

Alternate complex forms

$938.29+46.87\,i$

$939.46\,(\cos(0.049916)+i\sin(0.049916))$

$$939.46\, e^{0.049916\, i}$$

Expanded form

$$\frac{1024\,\pi}{3} + \frac{512}{3}\tan^{-1}\left((-1)^{5/6}\right)$$

Alternate forms

$$\frac{896\,\pi}{3} + \frac{128}{3}\, i \log(3)$$

$$\frac{512}{3}\left(2\,\pi + \tan^{-1}\left((-1)^{5/6}\right)\right)$$

$$\frac{2816\,\pi}{9} + \frac{256}{3}\, i \log\left(1 + \sqrt[3]{-1}\right)$$

$\log(x)$ is the natural logarithm

Alternative representations

$$\frac{1}{3}\left(\frac{8^4\,\pi}{4} + 8^3 \tan^{-1}\left((-1)^{5/6}\right)\right) = \frac{1}{3}\left(\mathrm{sc}^{-1}\left((-1)^{5/6} \mid 0\right) 8^3 + \frac{\pi\, 8^4}{4}\right)$$

$$\frac{1}{3}\left(\frac{8^4\,\pi}{4} + 8^3 \tan^{-1}\left((-1)^{5/6}\right)\right) = \frac{1}{3}\left(\tan^{-1}\left(1, (-1)^{5/6}\right) 8^3 + \frac{\pi\, 8^4}{4}\right)$$

$$\frac{1}{3}\left(\frac{8^4\,\pi}{4} + 8^3 \tan^{-1}\left((-1)^{5/6}\right)\right) = \frac{1}{3}\left(i \tanh^{-1}\left(-i\,(-1)^{5/6}\right) 8^3 + \frac{\pi\, 8^4}{4}\right)$$

$\text{sc}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function sc

$\tan^{-1}(x, y)$ is the inverse tangent function

$\tanh^{-1}(x)$ is the inverse hyperbolic tangent function

i is the imaginary unit

Series representations

$$\frac{1}{3}\left(\frac{8^4\,\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)=$$
$$\frac{1024\,\pi}{3}+\frac{256}{3}\,i\log\left(\frac{1}{4}\left(3+i\sqrt{3}\right)\right)+\frac{256}{3}\,i\sum_{k=1}^{\infty}\frac{\left(\frac{1}{2}\left(1+\sqrt[3]{-1}\right)\right)^k}{k}$$

$$\frac{1}{3}\left(\frac{8^4\,\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)=\frac{2816\,\pi}{9}+\frac{256}{3}\,i\log(2)-\frac{256}{3}\,i\sum_{k=1}^{\infty}\frac{\left(\frac{1}{2}\left(1-\sqrt[3]{-1}\right)\right)^k}{k}$$

$$\frac{1}{3}\left(\frac{8^4\,\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)=\frac{1024\,\pi}{3}+\frac{512}{3}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{5}\right)^k\left(\frac{2(-1)^{5/6}}{1+\sqrt{1-\frac{4}{5}(-1)^{2/3}}}\right)^{1+2k}F_{1+2k}}{1+2k}$$

F_n is the n^{th} Fibonacci number

Integral representations

$$\frac{1}{3}\left(\frac{8^4\,\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)=\frac{1024\,\pi}{3}+\frac{512}{3}\,(-1)^{5/6}\int_0^1\frac{1}{1-(-1)^{2/3}\,t^2}\,dt$$

$$\frac{1}{3}\left(\frac{8^4\,\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)=\frac{1024\,\pi}{3}+\frac{128\,\sqrt[3]{-1}}{3\,\pi^{3/2}}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(1-(-1)^{2/3}\right)^{-s}\,\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)^2\,ds\quad\text{for } 0<\gamma<\frac{1}{2}$$

$$\frac{1}{3}\left(\frac{8^4\,\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)=\frac{1024\,\pi}{3}+\frac{128\,\sqrt[3]{-1}}{3\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{(i\,\pi\,s)/3}\,\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds\quad\text{for } 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representations

$$\frac{1}{3}\left(\frac{8^4\,\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)=\frac{512}{3}\left(2\,\pi+\frac{(-1)^{5/6}}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-(-1)^{2/3}\,k^2}{1+2\,k}}\right)=\frac{512}{3}\left(2\,\pi+\cfrac{(-1)^{5/6}}{1+-\cfrac{(-1)^{2/3}}{3-\cfrac{4\,(-1)^{2/3}}{5-\cfrac{9\,(-1)^{2/3}}{7-\cfrac{16\,(-1)^{2/3}}{9+\ldots}}}}}\right)$$

$$\frac{1}{3}\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)=\frac{512}{3}\left((-1)^{5/6}+2\pi-\frac{i}{3+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-(-1)^{2/3}\left(1+(-1)^{1+k}+k\right)^2}{3+2k}}\right)=$$

$$\frac{512}{3}\left((-1)^{5/6}+2\pi-\cfrac{i}{3+-\cfrac{9(-1)^{2/3}}{5-\cfrac{4(-1)^{2/3}}{7-\cfrac{25(-1)^{2/3}}{9-\cfrac{16(-1)^{2/3}}{11+\ldots}}}}}\right)$$

$$\frac{1}{3}\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)=\frac{512}{3}\left(2\pi+\frac{(-1)^{5/6}}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-(-1)^{2/3}(1-2k)^2}{1+2k+(-1)^{2/3}(-1+2k)}}\right)=$$

$$\frac{512}{3}\left(2\pi+\cfrac{(-1)^{5/6}}{1+-\cfrac{(-1)^{2/3}}{3+(-1)^{2/3}-\cfrac{9(-1)^{2/3}}{5+3(-1)^{2/3}-\cfrac{25(-1)^{2/3}}{7+5(-1)^{2/3}-\cfrac{49(-1)^{2/3}}{9+7(-1)^{2/3}+\ldots}}}}}\right)$$

$$\frac{1}{3}\left(\frac{8^4\,\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)=$$

$$\frac{1}{3}\left(1024\,\pi+\frac{512\,(-1)^{5/6}}{1-(-1)^{2/3}+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-2\,(-1)^{2/3}\left(1-2\left\lfloor\frac{1+k}{2}\right\rfloor\right)\left\lfloor\frac{1+k}{2}\right\rfloor}{\left(1-\frac{1}{2}\,(-1)^{2/3}\left(1+(-1)^k\right)\right)(1+2k)}}\right)=$$

$$\frac{1}{3}\left(1024\,\pi+\cfrac{512\,(-1)^{5/6}}{1-(-1)^{2/3}+\cfrac{2\,(-1)^{2/3}}{3+\cfrac{2\,(-1)^{2/3}}{5\left(1-(-1)^{2/3}\right)+\cfrac{12\,(-1)^{2/3}}{7+\cfrac{12\,(-1)^{2/3}}{9\left(1-(-1)^{2/3}\right)+\ldots}}}}}\right)$$

$\underset{k=k_1}{\overset{k_2}{\mathrm{K}}}\,a_k\,/\,b_k$ is a continued fraction

$\lfloor x\rfloor$ is the floor function

From which:

(φ+1/5)(1/3 ((8^4 π)/4 + 8^3 tan^(-1)((-1)^(5/6))))+21

Input

$$\left(\phi+\frac{1}{5}\right)\left(\frac{1}{3}\left(\frac{1}{4}\left(8^4\,\pi\right)+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)\right)+21$$

$\tan^{-1}(x)$ is the inverse tangent function

ϕ is the golden ratio

Exact Result

$$\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(1024\,\pi+512\tan^{-1}\left((-1)^{5/6}\right)\right)+21$$

(result in radians)

Decimal approximation

1726.841303945921247765941923382899026376486921031391018356960089…

+

85.218751200295866287582414170889632280653126052496498946825827 70…

i

(result in radians)

Alternate complex forms

$1726.8 + 85.2\,i$

$1728.9\,(\cos(0.049309) + i\,\sin(0.049309))$

$1728.9\,e^{0.049309\,i}$

Polar coordinates

$r = 1728.9$ (radius), $\theta = 0.0492998$ (angle)

1728.9

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number).

Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternate forms

$$21+\frac{256}{15}\left(7+5\sqrt{5}\right)\left(2\pi+\tan^{-1}\left((-1)^{5/6}\right)\right)$$

$$21 + \frac{1}{30}\left(7 + 5\sqrt{5}\right)\left(1024\,\pi + 512\tan^{-1}\left((-1)^{5/6}\right)\right)$$

$$\frac{896}{15}\,\pi\,(5\,\phi + 1) + 21 + \frac{64}{15}\,i\left(7 + 5\sqrt{5}\right)\log(3)$$

log(x) is the natural logarithm

Expanded forms

$$\frac{1024\,\pi\,\phi}{3} + \frac{512}{3}\,\phi\tan^{-1}\left((-1)^{5/6}\right) + 21 + \frac{1024\,\pi}{15} + \frac{512}{15}\tan^{-1}\left((-1)^{5/6}\right)$$

$$21 + \frac{3584\,\pi}{15} + \frac{512\sqrt{5}\,\pi}{3} + \frac{1792}{15}\tan^{-1}\left((-1)^{5/6}\right) + \frac{256}{3}\sqrt{5}\,\tan^{-1}\left((-1)^{5/6}\right)$$

Alternative representations

$$\frac{1}{3}\left(\phi + \frac{1}{5}\right)\left(\frac{8^4\,\pi}{4} + 8^3\,\tan^{-1}\left((-1)^{5/6}\right)\right) + 21 =$$
$$21 + \frac{1}{3}\left(\phi + \frac{1}{5}\right)\left(\mathrm{sc}^{-1}\left((-1)^{5/6}\,\middle|\,0\right)8^3 + \frac{\pi\,8^4}{4}\right)$$

$$\frac{1}{3}\left(\phi + \frac{1}{5}\right)\left(\frac{8^4\,\pi}{4} + 8^3\,\tan^{-1}\left((-1)^{5/6}\right)\right) + 21 =$$
$$21 + \frac{1}{3}\left(\phi + \frac{1}{5}\right)\left(\tan^{-1}\left(1, (-1)^{5/6}\right)8^3 + \frac{\pi\,8^4}{4}\right)$$

$$\frac{1}{3}\left(\phi + \frac{1}{5}\right)\left(\frac{8^4\,\pi}{4} + 8^3\,\tan^{-1}\left((-1)^{5/6}\right)\right) + 21 =$$
$$21 + \frac{1}{3}\left(\phi + \frac{1}{5}\right)\left(i\tanh^{-1}\left(-i\,(-1)^{5/6}\right)8^3 + \frac{\pi\,8^4}{4}\right)$$

$\text{sc}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function sc

$\tan^{-1}(x, y)$ is the inverse tangent function

$\tanh^{-1}(x)$ is the inverse hyperbolic tangent function

i is the imaginary unit

Series representations

$$\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21=$$
$$21+\frac{128}{45}\left(7+5\sqrt{5}\right)\left(11\pi+3i\log(2)-3i\sum_{k=1}^{\infty}\frac{\left(\frac{1}{2}\left(1-\sqrt[3]{-1}\right)\right)^k}{k}\right)$$

$$\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21=$$
$$21+\frac{128}{15}\left(7+5\sqrt{5}\right)\left(4\pi+i\log\left(\frac{1}{4}\left(3+i\sqrt{3}\right)\right)+i\sum_{k=1}^{\infty}\frac{\left(\frac{1}{2}\left(1+\sqrt[3]{-1}\right)\right)^k}{k}\right)$$

$$\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21=$$
$$21+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\left(1024\pi+512\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{5}\right)^k\left(\frac{2(-1)^{5/6}}{1+\sqrt{1-\frac{4}{5}(-1)^{2/3}}}\right)^{1+2k}F_{1+2k}}{1+2k}\right)$$

F_n is the n^{th} Fibonacci number

Integral representations

$$\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\,\pi}{4}+8^3\,\tan^{-1}\left((-1)^{5/6}\right)\right)+21=$$
$$21+\frac{512}{3}\left(\frac{1}{5}+\phi\right)\left(2\,\pi+(-1)^{5/6}\int_0^1\frac{1}{1-(-1)^{2/3}\,t^2}\,dt\right)$$

$$\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\,\pi}{4}+8^3\,\tan^{-1}\left((-1)^{5/6}\right)\right)+21=21+\frac{1}{3}\left(\frac{1}{5}+\phi\right)$$
$$\left(1024\,\pi+\frac{128\,\sqrt[3]{-1}}{\pi^{3/2}}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(1-(-1)^{2/3}\right)^{-s}\,\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)^2\,ds\right)$$
$$\text{for } 0<\gamma<\frac{1}{2}$$

$$\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\,\pi}{4}+8^3\,\tan^{-1}\left((-1)^{5/6}\right)\right)+21=21+$$
$$\frac{64\left(7+5\sqrt{5}\right)\left(8\,\pi^2+\sqrt[3]{-1}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{e^{(i\,\pi\,s)/3}\,\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds\right)}{15\,\pi}\quad\text{for } 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representations

$$\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21=$$

$$21+\frac{512}{3}\left(\frac{1}{5}+\phi\right)\left(2\pi+\frac{(-1)^{5/6}}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-(-1)^{2/3}k^2}{1+2k}}\right)=$$

$$21+\frac{512}{3}\left(\frac{1}{5}+\phi\right)\left(2\pi+\cfrac{(-1)^{5/6}}{1+-\cfrac{(-1)^{2/3}}{3-\cfrac{4(-1)^{2/3}}{5-\cfrac{9(-1)^{2/3}}{7-\cfrac{16(-1)^{2/3}}{9+\ldots}}}}}\right)$$

$$\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21=$$

$$21+\frac{512}{3}\left(\frac{1}{5}+\phi\right)\left((-1)^{5/6}+2\pi-\frac{i}{3+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-(-1)^{2/3}\left(1+(-1)^{1+k}+k\right)^2}{3+2k}}\right)=$$

$$21+\frac{512}{3}\left(\frac{1}{5}+\phi\right)\left((-1)^{5/6}+2\pi-\cfrac{i}{3+-\cfrac{9(-1)^{2/3}}{5-\cfrac{4(-1)^{2/3}}{7-\cfrac{25(-1)^{2/3}}{9-\cfrac{16(-1)^{2/3}}{11+\ldots}}}}}\right)$$

$$\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21=$$

$$21+\frac{512}{3}\left(\frac{1}{5}+\phi\right)\left(2\pi+\frac{(-1)^{5/6}}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-(-1)^{2/3}(1-2k)^2}{1+2k+(-1)^{2/3}(-1+2k)}}\right)=21+\frac{512}{3}\left(\frac{1}{5}+\phi\right)$$

$$\left(2\pi+\cfrac{(-1)^{5/6}}{1+-\cfrac{(-1)^{2/3}}{3+(-1)^{2/3}-\cfrac{9(-1)^{2/3}}{5+3(-1)^{2/3}-\cfrac{25(-1)^{2/3}}{7+5(-1)^{2/3}-\cfrac{49(-1)^{2/3}}{9+7(-1)^{2/3}+\ldots}}}}}\right)$$

$$\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21=$$

$$21+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\left(1024\pi+\frac{512(-1)^{5/6}}{1-(-1)^{2/3}+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-2(-1)^{2/3}\left(1-2\left\lfloor\frac{1+k}{2}\right\rfloor\right)\left\lfloor\frac{1+k}{2}\right\rfloor}{\left(1-\frac{1}{2}(-1)^{2/3}\left(1+(-1)^k\right)\right)(1+2k)}}\right)=$$

$$21+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\left(1024\pi+\cfrac{512(-1)^{5/6}}{1-(-1)^{2/3}+\cfrac{2(-1)^{2/3}}{3+\cfrac{2(-1)^{2/3}}{5\left(1-(-1)^{2/3}\right)+\cfrac{12(-1)^{2/3}}{7+\cfrac{12(-1)^{2/3}}{9\left(1-(-1)^{2/3}\right)+\ldots}}}}}\right)$$

$\underset{k=k_1}{\overset{k_2}{\mathrm{K}}}\ a_k\,/\,b_k$ is a continued fraction

$\lfloor x \rfloor$ is the floor function

(1/27(((φ+1/5)(1/3 ((8^4 π)/4 + 8^3 tan^(-1)((-1)^(5/6))))+21)-1))^2+1/π

Input

$$\left(\frac{1}{27}\left(\left(\left(\phi+\frac{1}{5}\right)\left(\frac{1}{3}\left(\frac{1}{4}\left(8^4\,\pi\right)+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}$$

$\tan^{-1}(x)$ is the inverse tangent function

ϕ is the golden ratio

Exact result

$$\frac{1}{729}\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(1024\,\pi+512\tan^{-1}\left((-1)^{5/6}\right)\right)+20\right)^2+\frac{1}{\pi}$$

Decimal approximation

4076.128969487857040744940209968476513095394340609210336161766 50…

+

403.495310540909902133646730323490799256808651636942138098347 2279…

i

(result in radians)

Alternate complex forms

$4076.1 + 403.5\,i$

$4096.1\,(\cos(0.098668) + i\sin(0.098668))$

$4096.1\,e^{0.098668\,i}$

Polar coordinates

$r = 4096.02$ (radius), $\theta = 0.0986702$ (angle)

$4096.02 \approx 4096$

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternate forms

$$\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{256}{15}\left(7+5\sqrt{5}\right)\left(2\pi+\tan^{-1}\left((-1)^{5/6}\right)\right)\right)^2$$

$$\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{1}{30}\left(7+5\sqrt{5}\right)\left(1024\pi+512\tan^{-1}\left((-1)^{5/6}\right)\right)\right)^2$$

$$\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{1}{3}\left(\frac{1}{5}+\frac{1}{2}\left(1+\sqrt{5}\right)\right)\left(1024\pi+512\tan^{-1}\left((-1)^{5/6}\right)\right)\right)^2$$

Expanded form

$$\frac{40960\,\pi\,\phi}{2187}+\frac{2097152\,\pi^2\,\phi}{32805}+\frac{1048576\,\pi^2\,\phi^2}{6561}+\frac{20480\,\phi\tan^{-1}\left((-1)^{5/6}\right)}{2187}+\frac{2097152\,\pi\,\phi\tan^{-1}\left((-1)^{5/6}\right)}{32805}+\frac{1048576\,\pi\,\phi^2\tan^{-1}\left((-1)^{5/6}\right)}{6561}+\frac{524288\,\phi\tan^{-1}\left((-1)^{5/6}\right)^2}{32805}+\frac{262144\,\phi^2\tan^{-1}\left((-1)^{5/6}\right)^2}{6561}+\frac{400}{729}+\frac{1}{\pi}+\frac{8192\,\pi}{2187}+\frac{1048576\,\pi^2}{164025}+\frac{4096\tan^{-1}\left((-1)^{5/6}\right)}{2187}+\frac{1048576\,\pi\tan^{-1}\left((-1)^{5/6}\right)}{164025}+\frac{262144\tan^{-1}\left((-1)^{5/6}\right)^2}{164025}$$

Alternative representations

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\,\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}=\frac{1}{\pi}+\left(\frac{1}{27}\left(20+\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\text{sc}^{-1}\left((-1)^{5/6}\,\middle|\,0\right)8^3+\frac{\pi\,8^4}{4}\right)\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\,\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}=\frac{1}{\pi}+\left(\frac{1}{27}\left(20+\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\tan^{-1}\left(1,(-1)^{5/6}\right)8^3+\frac{\pi\,8^4}{4}\right)\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\,\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}=\frac{1}{\pi}+\left(\frac{1}{27}\left(20+\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\cot^{-1}\left(\frac{1}{(-1)^{5/6}}\right)8^3+\frac{\pi\,8^4}{4}\right)\right)\right)^2$$

$\text{sc}^{-1}(x\mid m)$ is the inverse of the Jacobi elliptic function sc

$\tan^{-1}(x,y)$ is the inverse tangent function

$\cot^{-1}(x)$ is the inverse cotangent function

Series representations

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}=\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\left(1024\pi+256\,i\left(\frac{i\pi}{3}+\log(2)-\sum_{k=1}^{\infty}\frac{\left(\frac{i}{2}\right)^k\left(-i+(-1)^{5/6}\right)^k}{k}\right)\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}=\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\left(1024\pi+256\,i\left(-\log(2)+\log\left(-i\left(i+(-1)^{5/6}\right)\right)+\sum_{k=1}^{\infty}\frac{\left(-\frac{i}{2}\right)^k\left(i+(-1)^{5/6}\right)^k}{k}\right)\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}=\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\left(1024\pi+512\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{5}\right)^k\left(\frac{2(-1)^{5/6}}{1+\sqrt{1-\frac{4}{5}(-1)^{2/3}}}\right)^{1+2k}F_{1+2k}}{1+2k}\right)\right)^2$$

log(x) is the natural logarithm

F_n is the n^{th} Fibonacci number

Integral representations

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}=\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{512}{3}\left(\frac{1}{5}+\phi\right)\left(2\pi+(-1)^{5/6}\int_0^1\frac{1}{1-(-1)^{2/3}\,t^2}\,dt\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}=$$
$$\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\left(1024\,\pi+\frac{128\sqrt[3]{-1}}{\pi^{3/2}}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(1-(-1)^{2/3}\right)^{-s}\right.\right.$$
$$\left.\left.\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)^2\,ds\right)\right)^2 \quad \text{for } 0<\gamma<\frac{1}{2}$$

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}=$$
$$\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\right.$$
$$\left.\left(1024\,\pi+\frac{128\sqrt[3]{-1}}{\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\left(-(-1)^{2/3}\right)^{-s}\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\right.\right.$$
$$\left.\left.ds\right)\right)^2 \quad \text{for } 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representations

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}=$$
$$\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{512}{3}\left(\frac{1}{5}+\phi\right)\left(2\,\pi+\frac{(-1)^{5/6}}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-(-1)^{2/3}\,k^2}{1+2k}}\right)\right)^2=$$
$$\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{512}{3}\left(\frac{1}{5}+\phi\right)\left(2\,\pi+\cfrac{(-1)^{5/6}}{1+-\cfrac{(-1)^{2/3}}{3-\cfrac{4\,(-1)^{2/3}}{5-\cfrac{9\,(-1)^{2/3}}{7-\cfrac{16\,(-1)^{2/3}}{9+\ldots}}}}}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}=\frac{1}{\pi}+\frac{1}{729}$$
$$\left(20+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\left(1024\,\pi+512\left((-1)^{5/6}-\frac{i}{3+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-(-1)^{2/3}\left(1+(-1)^{1+k}+k\right)^2}{3+2k}}\right)\right)\right)^2=$$
$$\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\left(1024\,\pi+512\left((-1)^{5/6}-\frac{i}{3+-\frac{9\,(-1)^{2/3}}{5-\frac{4\,(-1)^{2/3}}{7-\frac{25\,(-1)^{2/3}}{9-\frac{16\,(-1)^{2/3}}{11+\ldots}}}}}\right)\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}=$$
$$\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\left(1024\,\pi+\frac{512\,(-1)^{5/6}}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-(-1)^{2/3}\,(-1+2k)^2}{1+2k+(-1)^{2/3}\,(-1+2k)}}\right)\right)^2=$$
$$\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\left(1024\,\pi+\left(512\,(-1)^{5/6}\right)\Big/\left(1+-\left((-1)^{2/3}\Big/\left(3+(-1)^{2/3}-\left(9\,(-1)^{2/3}\right)\Big/\left(5+3\,(-1)^{2/3}-\frac{25\,(-1)^{2/3}}{7+5\,(-1)^{2/3}-\frac{49\,(-1)^{2/3}}{9+7\,(-1)^{2/3}+\ldots}}\right)\right)\right)\right)\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(\frac{8^4\pi}{4}+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)+21\right)-1\right)\right)^2+\frac{1}{\pi}=\frac{1}{\pi}+$$

$$\frac{1}{729}\left(20+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\left(1024\,\pi+\frac{512\,(-1)^{5/6}}{1-(-1)^{2/3}+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-2\,(-1)^{2/3}\left(1-2\left\lfloor\frac{1+k}{2}\right\rfloor\right)\left\lfloor\frac{1+k}{2}\right\rfloor}{\left(1-\frac{1}{2}\,(-1)^{2/3}\left(1+(-1)^k\right)\right)(1+2k)}}\right)\right)^2=$$

$$\frac{1}{\pi}+\frac{1}{729}\left(20+\frac{1}{3}\left(\frac{1}{5}+\phi\right)\left(1024\,\pi+\right.\right.$$

$$\left.\left.\frac{512\,(-1)^{5/6}}{1-(-1)^{2/3}+\cfrac{2\,(-1)^{2/3}}{3+\cfrac{2\,(-1)^{2/3}}{5\left(1-(-1)^{2/3}\right)+\cfrac{12\,(-1)^{2/3}}{7+\cfrac{12\,(-1)^{2/3}}{9\left(1-(-1)^{2/3}\right)+\ldots}}}}}\right)\right)^2$$

$\underset{k=k_1}{\overset{k_2}{\mathrm{K}}}\,a_k\,/\,b_k$ is a continued fraction

$\lfloor x \rfloor$ is the floor function

((φ+1/5)(1/3 ((8^4 π)/4 + 8^3 tan^(-1)((-1)^(5/6))))+21)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{\left(\phi+\frac{1}{5}\right)\left(\frac{1}{3}\left(\frac{1}{4}\left(8^4\,\pi\right)+8^3\tan^{-1}\left((-1)^{5/6}\right)\right)\right)+21}+C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}$$

$\tan^{-1}(x)$ is the inverse tangent function

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\sqrt[15]{\frac{1}{3}\left(\phi+\frac{1}{5}\right)\left(1024\,\pi+512\tan^{-1}\left((-1)^{5/6}\right)\right)+21}$$

Decimal approximation

1.644925515345794999703530540083551515553456138320741089660457… +
0.005403691576281790691828144064373564589864647792682236962553039…
i

(result in radians)

Alternate complex forms

$1.6449 + 0.0054\,i$

$1.6449\,(\cos(0.0032851) + i\sin(0.0032851))$

$1.6449\,e^{0.0032851\,i}$

Polar coordinates

$r = 1.64491$ (radius), $\theta = 0.00328286$ (angle)

1.64491 ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi} + \sqrt[15]{21 + \frac{256}{15}\left(7 + 5\sqrt{5}\right)\left(2\pi + \tan^{-1}\left((-1)^{5/6}\right)\right)}$$

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi} + \sqrt[15]{21 + \frac{1}{30}\left(7 + 5\sqrt{5}\right)\left(1024\,\pi + 512\tan^{-1}\left((-1)^{5/6}\right)\right)}$$

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi} + \sqrt[15]{21 + \frac{1}{3}\left(\phi + \frac{1}{5}\right)\left(1024\,\pi + 256\,i\left(\log\left(1 + \sqrt[3]{-1}\right) + \frac{i\,\pi}{3}\right)\right)}$$

log(x) is the natural logarithm

Expanded forms

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi} + \sqrt[15]{21 + \frac{3584\,\pi}{15} + \frac{512\sqrt{5}\,\pi}{3} + \frac{1792}{15}\tan^{-1}\left((-1)^{5/6}\right) + \frac{256}{3}\sqrt{5}\,\tan^{-1}\left((-1)^{5/6}\right)}$$

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi} + \sqrt[15]{21 + \frac{1}{3}\left(\frac{1}{5} + \frac{1}{2}\left(1 + \sqrt{5}\right)\right)\left(1024\,\pi + 512\tan^{-1}\left((-1)^{5/6}\right)\right)}$$

Solar eclipses, tides and earthquakes

The solar eclipse of April 17, 1912 is an astronomical event that took place on the aforementioned day around 11.34 UTC. The total eclipse was visible in some parts of South America (Guyana and Suriname), Africa, Europe and Russia.

Tipo	Totale
Gamma	0.528
Magnitudine	1.0003
Coordinate eclissi massima	38.4°N 11.3°W
Orari (UTC)	
Eclissi massima	11:34:22

Earthquakes

May 9 1912, 23:03 Tirol, Innsbruck

Data	1912-05-09 23:03
Lat, Lon	47.270, 11.390
Io	5-6
Mw	4.63 ± 0.18

May 11 1912, 05:14 Cagliese

Data	1912-05-11 05:14
Lat, Lon	43.580, 12.609
Io	4-5
Mw	3.96 ± 0.56

May 31 1912, 9.40pm Canavese (area of Piedmont between Turin and the Aosta Valley and, towards the east, the Biellese and Vercellese.)

Data	1912-05-31 21:40
Lat, Lon	45.549, 7.785
Io	5-6
Mw	4.71 ± 0.27

We note that:

April, 17 1912 + 29 days 12 hours 44 minutes 3 seconds

Input interpretation

Wednesday, April 17, 1912 + 29 days 12 hours 44 minutes 3 seconds

Result

12:44:03 pm CET | Thursday, May 16, 1912

Moon phases May 2012

1 Maggio 1912	**LUNA PIENA** alle 10:19		10°39′
9 Maggio 1912	**Ultimo quarto**		19°25′
16 Maggio 1912	**LUNA NUOVA** alle 22:13		25°38′
23 Maggio 1912	**Primo quarto**		0°46′
30 Maggio 1912	**LUNA PIENA** alle 23:29		9°08′

Earthquakes: 09.05.1912 ; 11.05.1912 ; 31.05.1912

(10h 19m)

Input interpretation

10 hours 19 minutes

Results

10.32 hours

619 minutes

Unit conversions

37 140 seconds

37140 seconds = 10.31666666667°

10.316°

Input interpretation

10.316° (degrees)

Unit conversions

180 mrad (milliradians)

0.18 radians

---

10 degrees 19 arcminutes

10° 19’

(22h 13m)

Input interpretation

22 hours 13 minutes

Results

1333 minutes

22.22 hours

Unit conversions

79980 seconds

79980 seconds = 22.21666666667°

(23h 29m)

Input interpretation

23 hours 29 minutes

Results

23.48 hours

1409 minutes

Unit conversions

84 540 seconds

84540 seconds = 23.48333333333°

From the sum of the two above results, we obtain:

(22.21666666667°+23.48333333333°)

Input interpretation

22.21666666667° (degrees) + 23.48333333333° (degrees)

Result

45.7° (degrees)

Unit conversions

797.615468161 mrad (milliradians)

0.797615468161 radians

---

45 degrees 42 arcminutes

45° 42’

45° 42’ N 10° 19’ E (Casto, Province of Brescia – 188 km away from Canavese)

(10° 19’ + 22.21666666667°+23.48333333333° - 9° 8’)

Input interpretation

10 degrees 19 arcminutes + 22.21666666667° (degrees) +
23.48333333333° (degrees) – 9 degrees 8 arcminutes

Results

46 degrees 53 arcminutes

46° 53’

(10° 19’ + 0° 46’)

Input interpretation

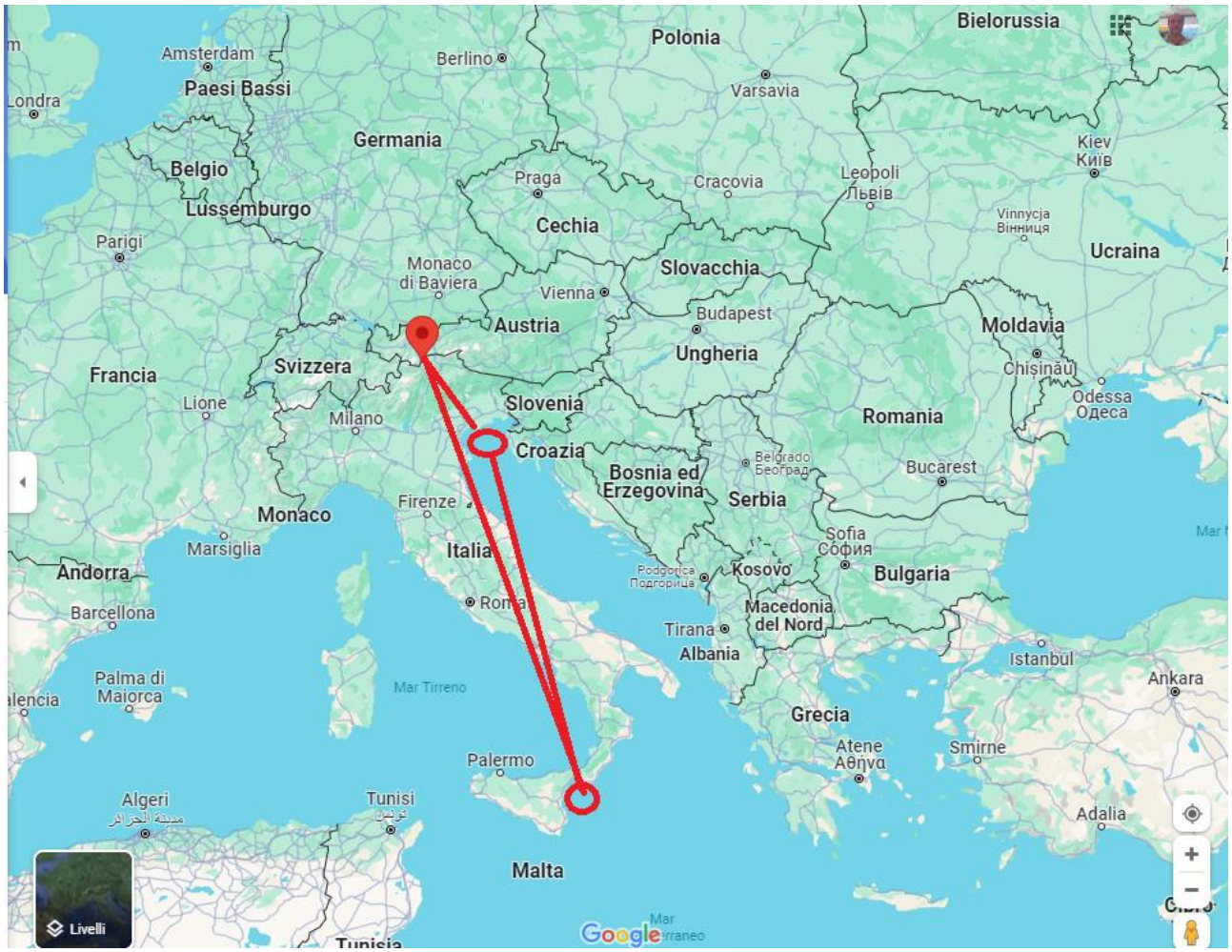
10 degrees 19 arcminutes + 46 arcminutes

Results

11 degrees 5 arcminutes

11° 5’

46° 53’ N 11° 5’ E Hochgurgl, Austria, 100.5 Km away from Innsbruck, Austria



The 1912 Mürefte earthquake occurred at 03:29 local time on August 9. It had an estimated magnitude of 7.4 Mw and a maximum intensity of X (Extreme) on the Mercalli scale, 41°10′N 27°20′E (Muratlı, Tekirdağ Province, Turkey)

15.08.1912 Earthquake near Barberino di Mugello, Metropolitan City of Florence

Moon phases August 1912

6 Agosto 1912	**Ultimo quarto**		17°32’

12 Agosto 1912	**LUNA NUOVA** alle 19:57		19°41’

(19h 57m)

Input interpretation

19 hours 57 minutes

Results

19.95 hours

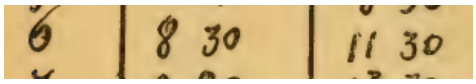
1197 minutes

Unit conversions

71 820 seconds

71820 seconds = 19.95°

Venice Tides



A B

A B

(8h 30m)

Input interpretation

8 hours 30 minutes

Results

8.5 hours

510 minutes

Unit conversions

30 600 seconds

30600 seconds = 8.5°

(11h 30m)

Input interpretation

11 hours 30 minutes

Results

11.5 hours

690 minutes

Unit conversions

41 400 seconds

41400 seconds = 11.5°

(17h 15m)

Input interpretation

17 hours 15 minutes

Results

1035 minutes

17.25 hours

Unit conversions

62 100 seconds

62100 seconds = 17.25°

(1h 15m)

Input interpretation

1 hour 15 minutes

Results

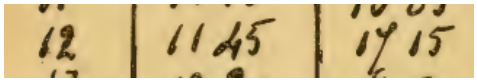
1.25 hours

75 minutes

Unit conversion

4500 seconds

4500 seconds = 1.25°



A B

A B

(11h 45m)

Input interpretation

11 hours 45 minutes

Results

11.75 hours

705 minutes

Unit conversions

42 300 seconds

42300 seconds = 11.75°

(17h 15m)

Input interpretation

17 hours 15 minutes

Results

1035 minutes

17.25 hours

Unit conversions

62 100 seconds

62100 seconds = 17.25°

(22h 30m)

Input interpretation

22 hours 30 minutes

Results

22.5 hours

1350 minutes

Unit conversions

81 000 seconds

81000 seconds = 22.5°

(4h 55m)

Input interpretation

4 hours 55 minutes

Results

4.917 hours

295 minutes

Unit conversions

17 700 seconds

17700 seconds = 4.916666666667°

(11.75°-17.25°+22.5°-4.916666666667°)

Input interpretation

11.75° (degrees) – 17.25° (degrees) + 22.5° (degrees) – 4.916666666667° (degrees)

Result

12.08° (degrees)

Unit conversions

210.9 mrad (milliradians)

0.2109 radians

---

12 degrees 5 arcminutes

12° 5’

Ischia Tides

06.08.1912

A A

(3h 55m)

Input interpretation

3 hours 55 minutes

Results

3.917 hours

235 minutes

Unit conversions

14 100 seconds

14100 seconds = 3.916°

(16h 35m)

Input interpretation

16 hours 35 minutes

Results

16.58 hours

995 minutes

Unit conversions

59 700 seconds

59700 seconds = 16.583°

From the algebraic sum of the above results, we obtain:

(8.5°-11.5°+17.25°-1.25°+3.916°+16.583°)

Input interpretation

8.5° (degrees) − 11.5° (degrees) + 17.25° (degrees) −
1.25° (degrees) + 3.916° (degrees) + 16.583° (degrees)

Result

33.5° (degrees)

Unit conversions

585 mrad (milliradians)

0.585 radians

---

33 degrees 30 arcminutes

33° 30’

12.08.1912

A A

(9h 20m)

Input interpretation

9 hours 20 minutes

Results

9.333 hours

560 minutes

Unit conversions

33 600 seconds

33600 seconds = 9.33°

(21h 40m)

Input interpretation

21 hours 40 minutes

Results

21.67 hours

1300 minutes

Unit conversions

78 000 seconds

78000 seconds = 21.66°

From the sum of the above results, we obtain:

(12° 5' + 9.33° + 21.66°)

Input interpretation

12 degrees 5 arcminutes + 9.33° (degrees) + 21.66° (degrees)

Results

43 degrees 4.4 arcminutes

43° 4’

43° 4’ N 12° 5’ E = Castiglione del Lago, Province of Perugia (Umbria). Distance from Barberino del Mugello 157 km

We obtain also:

(8.5°-11.5°+17.25°-1.25°+3.916°+16.583°+17°32’-9.33°)

Input interpretation

8.5° (degrees) − 11.5° (degrees) + 17.25° (degrees) − 1.25° (degrees) +
3.916° (degrees) + 16.583° (degrees) + 17 degrees 32 arcminutes − 9.33° (degrees)

Results

41 degrees 42 arcminutes

41° 42’

41.7° (degrees)

(17°32’+9.33°)

Input interpretation

17 degrees 32 arcminutes + 9.33° (degrees)

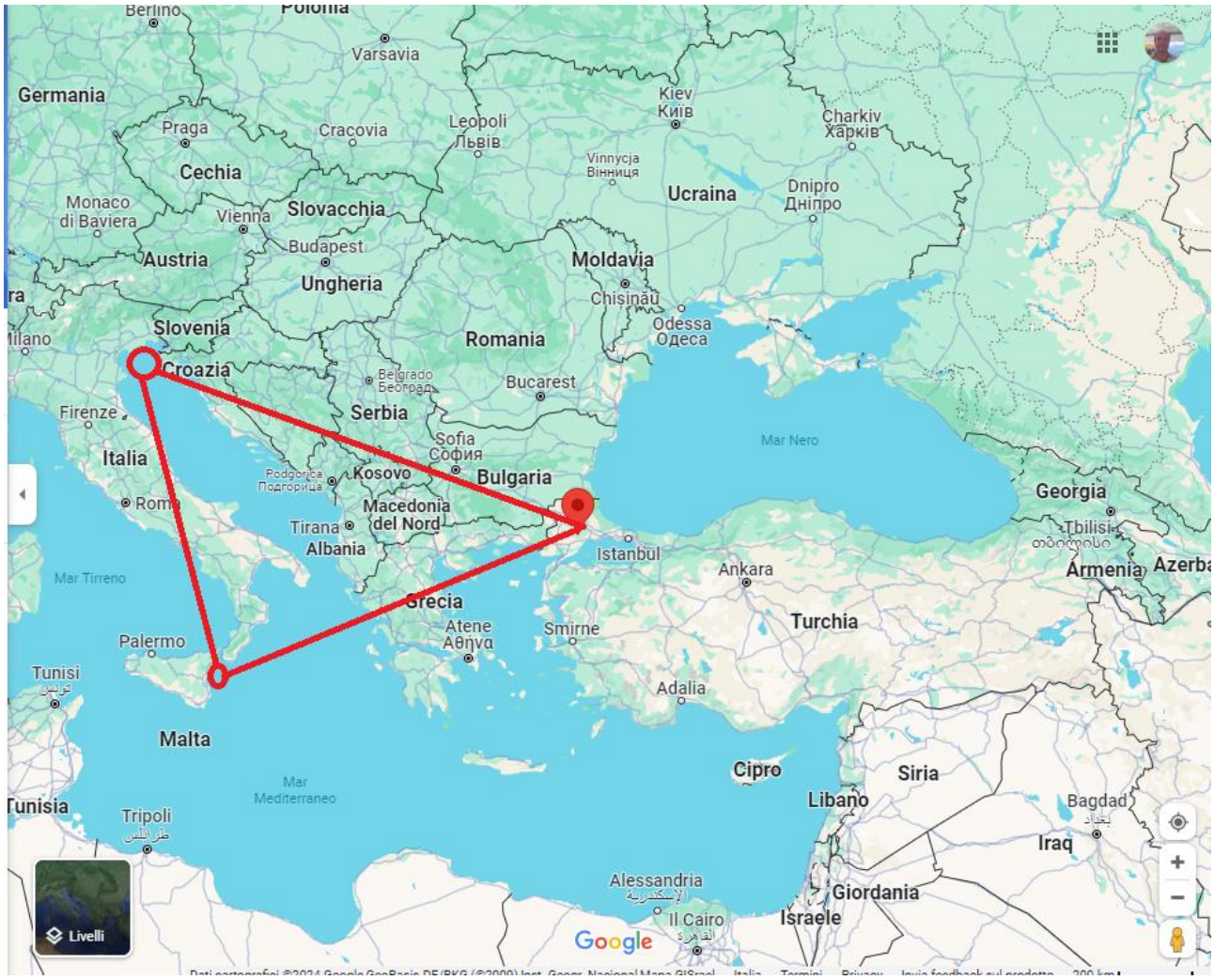
Results

26 degrees 51.8 arcminutes

26° 51.8’

26.86° (degrees)

41° 42' N 26° 51.8' E Havsa District, Edirne Province, Turkey, 88 km away from Tekirdağ Province



From

Eclisse Solare del 17 Aprile 1912 – Nota del *Prof. Giulio Grablovitz*

Il calcolo fu eseguito pei soliti 9 punti che corrispondono all'intersezione dei paralleli di 38°, 42° e 46° N. coi meridiani di 7° 30′, 12° 30′ e 17° 30′ E. Greenwich e ne furono tratte le formole qui appresso. Essendo cioè L la latitudine geografica Nord e l la longitudine Est Greenwich del luogo pel quale si desiderano le circostanze, si ponga:

$$L - 42^\circ = m, \quad l - 12^\circ\,30' = n$$

e sia P l'istante del primo contatto,
H " " della massima fase,
F " " " fine,
W l'angolo di posizione N verso W all'ingresso,
E " " " " N " E all'egresso e
M i millesimi di diametro occultati nella massima fase.

I rispettivi valori si ottengono dalle formole seguenti:

$$P = 11^h\,55^m\,54^s.2 + 58^s.58\,m + 115^s.53\,n + 0^s.600\,m^2 + 0^s.990\,n^2 - 4^s.525\,mn$$
$$H = 13^h\,18^m\,24^s.6 + 68^s.79\,m + 101^s.30\,n - 0^s.052\,m^2 + 0^s.327\,n^2 - 2^s.250\,mn$$
$$F = 14^h\,40^m\,13^s.1 + 70^s.42\,m + 69^s.13\,n - 3^s.792\,m^2 - 0^s.667\,n^2 - 0^s.225\,mn$$
$$W = 112^\circ.4 + 1^\circ.17\,m - 0^\circ.97\,n - 0^\circ.016\,m^2 - 0^\circ.027\,n^2 + 0^\circ.020\,mn$$
$$E = 36^\circ.8 + 1^\circ.77\,m - 0^\circ.51\,n - 0^\circ.007\,m^2 + 0^\circ.010\,n^2 + 0^\circ.020\,mn$$
$$M = 705.2 + 25.30\,m + 12.77\,n + 0.010\,m^2 + 0.167\,n^2 + 0.388\,mn$$

A titolo d' esempio espongo il dettaglio del calcolo per Ischia, assumendo le coordinate geografiche della torre meteorica presso al Porto, cioè :

$$L = 40^\circ\ 44'\ 27'' , \quad l = 13^\circ\ 56'\ 35''$$

	P	H	F	W	E	M
	$11^h\ 55^m\ 54^s2$	$13^h\ 18^m\ 24^s6$	$14^h\ 40^m\ 13^s1$	$112^\circ 4$	$36^\circ 8$	705. 2
$m = -1^\circ259$	− 1 13. 7	− 1 26. 6	− 1 28. 7	− 1. 5	−2. 2	−31. 8
$n = +1.443$	+ 2 46. 9	+ 2 26. 1	+ 1 39. 8	− 1. 4	−0. 7	−18. 5
$m^2 = +1.586$	+ 0. 9	− 0. 1	− 6. 0	0	0	0
$n^2 = +2.082$	+ 2. 1	+ 0. 7	− 1. 4	0	0	+0. 3
$mn = -1.816$	+ 8. 2	+ 4. 1	+ 0. 4	0	0	−0. 7
	$11^h\ 57^m\ 22^s2$	$13^h\ 19^m\ 28^s8$	$14^h\ 40^m\ 17^s2$	$109^\circ 5$	$33^\circ 9$	691. 5

Naturalmente queste formole non sono applicabili che alle località incluse nel suddetto reticolato o poco al di fuori di questo ; perciò per la Tripolitania ho eseguito un calcolo

We consider:

H = 13h 19m 28.8’

13 hours 19 minutes 28.8 seconds

Input interpretation

13 hours 19 minutes 28.8 seconds

Results

13 hours 19 minutes 28.8 seconds

13.32 hours

47969 seconds

47969 seconds = 13.32472222222°

Input interpretation

13.32472222222° (degrees)

Unit conversions

232.560274691 mrad (milliradians)

0.232560274691 radians

---

13 degrees 19 arcminutes 29 arcseconds

13° 19’

17 Aprile 1912	**LUNA NUOVA** alle 11:39 **Eclissi solare**	27°04’

(27° 04’ + 13° 19’)

Input interpretation

27 degrees 4 arcminutes + 13 degrees 19 arcminutes

Results

40 degrees 23 arcminutes

40° 23’

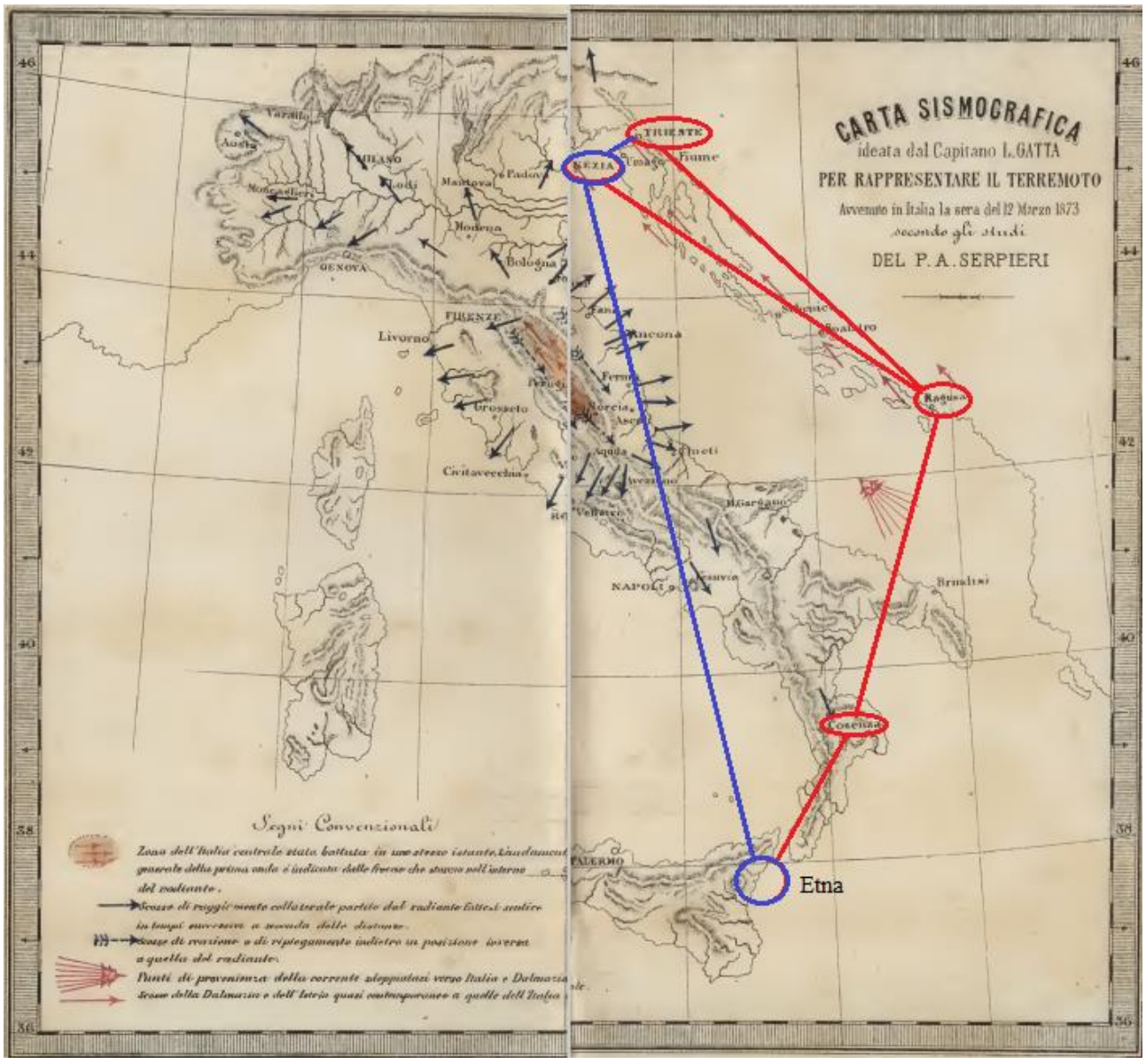
40° 23’ N 13° 19’ E Tyrrhenian Sea, facing Naples, Sorrento and Salerno

1 Aprile 1912	**LUNA PIENA** alle 22:04 **Eclissi lunare**		11°48′

Earthquakes:

06.04.1912 V Mercalli earthquake near Villa Santa Lucia, Province of Frosinone

On the earthquake of March 12, 1873



From

“Meteorologia Endogena” – *Michele Stefano Prof. De Rossi*

Earthquakes 1873 – 1874

(in Italian)

« Questo rumore non era ancora cessato, che ad un tratto, appena battute le 9 di sera, una forte scossa smuoveva tutta quanta l'Italia da Cosenza a Belluno. Dove nacque

penisola, e quindi venuta di fuori. Egli osserva inoltre che questa stessa onda si è spinta molto innanzi a tramontana ed a mezzogiorno, cioè ad Aosta e Cosenza; mentre il moto perpendicolare al primo corse verso le due spiagge marine, ma non discese e non salì molto nelle latitudini e con una bella figura rappresenta il terremoto come un grande e precipitoso fiume che ha corso da Cosenza ad Aosta o viceversa, e in mille punti ha rotto gli argini spingendosi con forti correnti a destra ed a sinistra ».

« Dalle notizie dall'egregio professore raccolte anzitutto appare che i moti geosismici hanno cominciato a manifestarsi sulla riva orientale dell'Adriatico, e che l'ora media del terremoto da Ragusa a Venezia (tempo di Roma) fu 9 ore 3′ 1/5,

Ragusa-Sebenico	lat. med.	43°	19	ore 9, 0′	2/5
Zara-Pola	»	44°	29	» 9, 2′	1/5
Pisino-Trieste	»	45°	25	» 9, 5′	3/10

« Vengono quindi le località poste verso o sulla riva occidentale dell'Adriatico e poi quelle del versante occidentale

« Se si considera che le prime scosse si fecero sentire a Ragusa a ore 8.56 1/2, a Cosenza, a Todi, a Foligno, a Zara alle ore 9, a Perugia alle ore 9 1′, a Firenze a ore 9 3′ 5/6, mentre nel resto d'Italia si manifestarono ad ora più tarda e nella valle della Salza l'ondulazione apparve a ore 9 22′ 1/2, subito si ravvisa che il movimento nacque realmente verso il centro della Penisola. « Alle origini del Tevere da Fi-

Foligno, da Perugia e dalle vicinanze di Firenze. Venne cioè il sotterraneo demone con larghissima potenza ad investire ad un colpo gran parte della penisola e di là stese le cento braccia a scuotere con moto convulso ambedue i lidi da Foggia a Venezia, da Cosenza a Genova, e le lontane creste delle Alpi. A tanta potenza e vastità di origine non poteva non corrispondere largo, lontanissimo effetto. »

« Il dotto ed elegante scrittore, pensa poi che il moto di Dalmazia contemporaneo a quello del radiante italiano possa aver avuto la stessa ed identica origine, e quantunque l'illustre Perrey gli scrivesse: « le scosse sentite il 12 marzo in Italia e sulla costa occidentale dell'Adriatico, mi sembrano manifestazioni di un solo e medesimo fenomeno » pur

« Egli dunque comincia per riconoscere l'esistenza di una corrente sotterranea, che venuta da S.-E. urtava intorno a Ragusa, mentre un ramo della medesima che era corso veloce e insidioso sotto il letto dell'Adriatico, svelandosi forse nei piccoli moti di Chieti, anteriori di 2' giungeva sotto l'Italia centrale percuotendo all'ora stessa con pesantissime onde nelle fratture sotterranee del Tevere e dell' Arno fra Spoleto e Firenze, e fedele compagna della corrente di Dalmazia, correva parallelamente con quella fino a riscontrarla ed a seppellirsi e disperdersi insieme nel grande anfiteatro alpino. »

altri. Imperocchè mentre in Dalmazia la corrente partita da Ragusa s'avviò al N.-O. con un movimento quasi uniforme; sul continente italiano la stessa corrente, o diramata o compagna a quella di Dalmazia, non restò paga a continuare il suo corso e a montare per le alte latitudini, ma quasi si divise in due rami laterali seguitando uno di essi verso l' Italia superiore e l'altro ripiegandosi indietro pervenne a battere anche con più furia le terre meridionali.

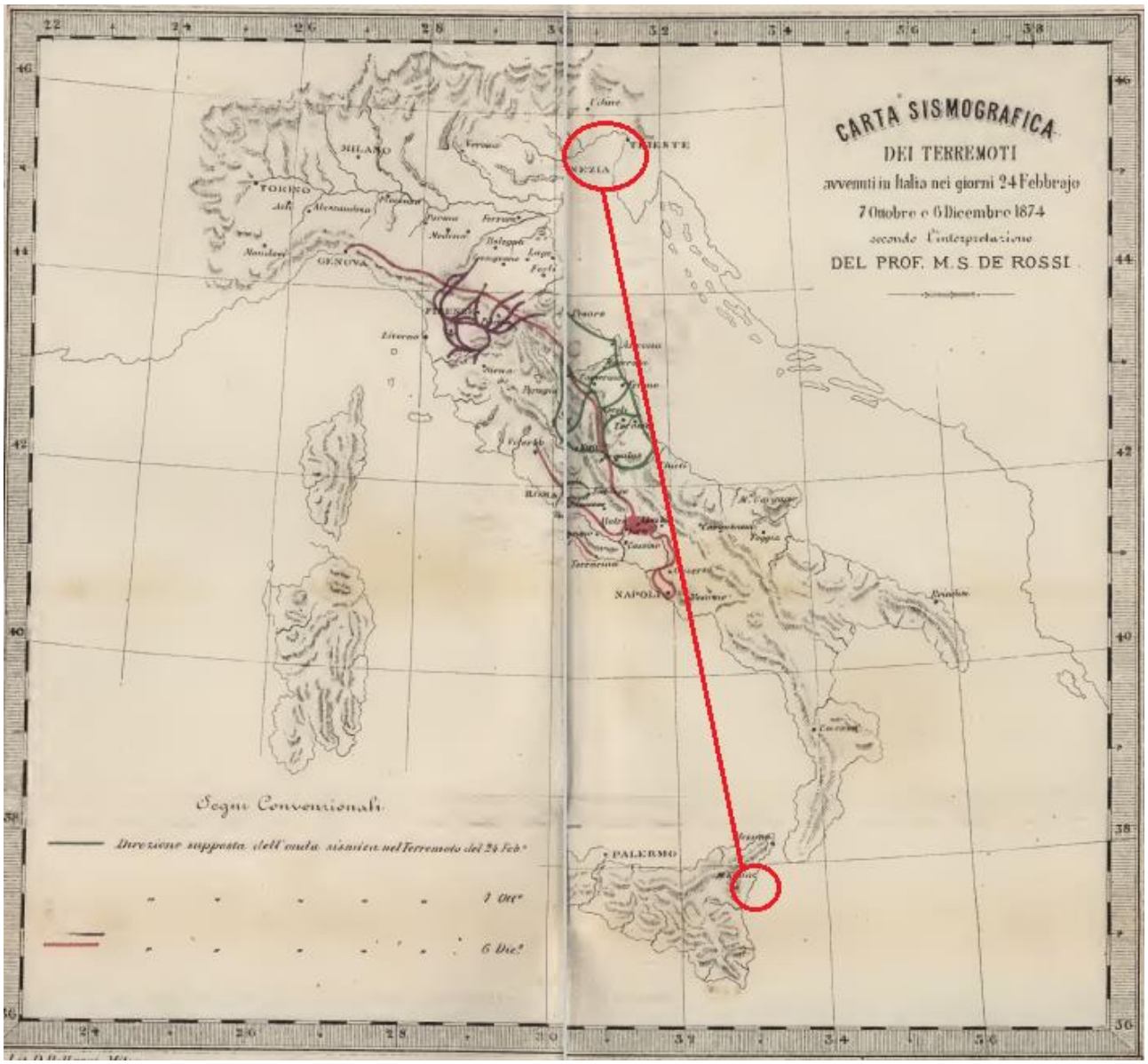
furono colpite 3′ o 4′ dopo i paesi più interni. Ma di più il lido Adriatico da Pescara a Rimini trabalzò a un tempo solo intorno a ore 9 5′. Tutti gli orologi della spiaggia

« Prendendo di mira le stazioni di Ragusa e Venezia, e poi quelle di Spoleto e Venezia, egli calcolò la distanza sopra un arco di circolo massimo della terra, ed ebbe per le prime due 299 miglia o 554 chilometri, e per le seconde 209 miglia o 387 chilometri. La prima distanza percorsa in

« Le altre freccie laterali pure azzurre, segnano le linee d'irraggiamento, e queste, confermando il principio generale, rappresentano veramente i fatti parziali. In un colpo d'occhio si vede come la stessa scossa siasi fatta sentire a Cosenza e ad Aosta, e la freccia lassù sopra Udine, segna la scossa che probabilmente per quella direzione andò fino a Salisburgo e si fece sentire a ore 9, 22′ ½ tempo di Roma. »

« Infine nell'Adriatico abbiamo fatto un fascio di freccie con a fianco un punto interrogativo, volendo con questo segnale indicare il supposto punto di provenienza della corrente sdoppiatasi verso l'Italia e verso Dalmazia. »

L'esser riuscito il Serpieri ad accertarsi dell'ora precisa, nella quale avvenne il fenomeno nelle varie regioni, gli fruttò la scoperta di due focolari o centri di movimento. Uno di questi centri apparve a Ragusa nella Dalmazia alle ore 8 56′; e diffuse le oscillazioni progredendo da S.-E. verso N.-O. con una velocità media di 62 chilometri per minuto primo. L'altro urtava nel centro appennino in una linea da Perugia a Spoleto e Norcia alle ore 9 2′ diffondendosi lungo l'asse appennino in due correnti opposte, dirette l'una verso l'Italia meridionale, l'altra verso la settentrionale. Da questa corrente centrale sull'asse montuoso diramavansi gli scuotimenti verso le rive dei mari, giungendo quasi tutta ad un colpo sull'Adriatico in media alle 9 4 ¾ ed al Mediterraneo alle 9 6 ½.


CARTA SISMOGRAFICA
DEI TERREMOTI
avvenuti in Italia nei giorni 24 Febbrajo
7 Ottobre e 6 Dicembre 1874
secondo l'interpretazione
DEL PROF. M.S. DE ROSSI
MILANO
TRIESTE
VENEZIA
GENOVA
NAPOLI
PALERMO
Segni Convenzionali
Direzione supposta dell'onda sismica nel Terremoto del 24 Feb.°
7 Ott.e
6 Dic.e

fare del grande terremoto del 12 marzo. In quel vastissimo terremoto mediante il duplice confronto dell'ora e delle direzioni delle scosse, il lodato autore riconobbe essere stata scossa dapprima una parte della zona assiale apennina e poscia essere stato propagato il moto diviso in altrettante correnti quante catene e valli dirigevansi dalle creste centrali dei monti verso i lidi dei due mari Tirreno ed Adriatico. La vastità di quel grande terremoto permise al Ser-

Riassumendo adunque i risultati tutti della svolta analisi concludiamo che ai 24 febbrajo 1874 un impulso sismico urtò assai presso le creste appennine nella regione di Camerino ossia nell' alta valle del Chienti. Da quel punto le correnti sismiche irragiarono all' intorno intromettendosi nelle fratture e si diressero in grossi volumi entro le principali, cioè lungo le creste dei monti Sibillini, nella valle del Nera ed in quella del Chienti. Dalla valle del Chienti la corrente penetrava nella grande frattura sinclinale appennina parallela al lido Adriatico e da quella rimontava le fratture e valli derivate dall' alto appennino centrale. Quivi incontravansi fra loro le correnti sismiche minori che dipartite dal comune centro ed avviate nella frattura della cresta assiale dei monti sibillini, deviavano a sinistra discendendo verso l'Adriatico. Nei luoghi ove avveniva l'incontro delle due correnti si sperimentava una intensità di scossa simile alla patita nel centro primitivo del fenomeno. La velocità media in questa porzione risultò di kil. 10 per ogni minuto primo.

visto che la tendenza di questo terremoto fu tutta unita nel riversarsi al nord, cioè nel versante Adriatico, e solo

Esaminate le notizie al punto di vista topografico, oltre alle cose già ragionate, esse ci fanno vedere che questo terremoto ebbe almeno due centri di partenza diversi e contemporanei, l'uno nella media Italia per le creste appennine presso Marradi, e l'altro nella meridionale in Sicilia verso Messina, perchè la porzione intermedia della penisola fra questi due punti non si scosse menomamente per quanto sappiamo. Alle 4 20', cioè poco prima della scossa, io faceva le osservazioni microsismiche in Rocca di Papa, e niuna straordinaria agitazione trovai nei pendoli che prenunziasse una prossima oscillazione sismica, lo che però non avvenne a Bologna al Malvasia, nella regione cioè del

From:

Nuova Teoria Sismica delle Maree – *Prof. Giulio Grablovitz*

(in Italian)

-

"La marea adriatica si forma alla latitudine di 38° a 39°, in causa delle oscillazioni impresse al suolo dall' attrazione luni-solare presso all' imbocco del mare Adriatico.„

Questa parte flessibile della crosta terrestre che, secondo tutte le apparenze, ha sede negli arcipelaghi d' indole vulcanica della Sicilia e della Grecia, ha per centro assai probabilmente il monte Etna.

Dalle osservazioni del mareografo di Venezia, trovai che il massimo valore di questa marea è di 25 a 30 centimetri allorchè la luna ed il sole hanno una declinazione massima all'epoca delle sizigie (il che avviene dopo i solstizi). Allora la marea risultante è = 0.10 ossia equivale ad un decimo dell'effetto totale, il che s'accorda assai prossimamente con l'altezza razionale delle maree desunta dalle leggi dell'attrazione universale.

Lo stabilimento del porto di Venezia (e di tutti i porti dell' Adriatico) varia secondo il tempo che la luna rimane sopra o sotto l' orizzonte e l'esperienza fatta in base alle indicazioni mareografiche m'insegnò che l'anticipazione od il ritardo sullo stabilimento medio (11^h 2′) è eguale alla metà dell'eccesso o della deficienza del rispettivo arco semi-diurno lunare riferito alla latitudine di 38° 30′. Ciò riesce naturale, quando si

aggiunta a quanto già dissi in proposito, accenno di volo al modo singolare in cui si manifestano le maree a Messina; benchè manchino dati precisi, si sa che sono molto irregolari ed assai più repentine che nell'Adriatico, vale a dire che i momenti della massima e minima altezza si possono valutare ad occhio senza errore apprezzabile, mentre a Trieste od a Venezia il più attento osservatore può ingannarsi di 15 minuti, senza l'aiuto di strumenti autoregistratori. Ne attribuisco la causa alla grande vicinanza del punto radiante, verso il quale tutte le acque convergono *contemporaneamente* nel momento della massima depressione del suolo, mentre ne divergono nella stessa guisa nel caso opposto. Probabilmente l'imponente vortice di Cariddi ha relazione col fenomeno delle maree, tanto più che il terremoto avvenuto in Sicilia ed in Calabria dopo il mezzodì del 5 febbraio 1783 ne scemò, a quanto si asserisce, la violenza.

From

Dell'attrazione luni-solare – *Prof. Giulio Grablovitz*

(in Italian)

verrebbe in ogni caso a modificare in più le latitudini determinate ed in questo modo si giungerebbe ad una latitudine più prossima ai 38° ch' è quella dell' Etna, presso cui io colloco il radiante della marea adriatica.

dell'Adriatico e seguisse le leggi di quella del Mediterraneo. Quest'ipotesi non si conforma certamente alla mia, che suppone il radiante della marea appunto nel mar Jonio.

Chiunque abbia avuto la pazienza di seguirmi fin qui, avrà compreso come io consideri tutta la penisola italiana e l'asse dell'Apennino che la traversa, come un raggio della grande plaga elastica avente per centro la regione vulcanica in cui sorge l'Etna. Questa plaga formerebbe a mio avviso un grande apparato sismico, di cui farebbero parte integrante i tre sistemi regionali, in cui si suol dividere l' Italia.

Grandemente soggette a terremoti sarebbero, a mio avviso, le lunghe catene di montagne il cui asse è diretto verso il radiante, ed in Italia verrebbe in prima linea da questo lato la catena degli Apennini e nella costa orientale dell' Adriatico le Alpi Dinariche; in seconda linea verrebbero i lati Est ed Ovest del semicerchio alpino ossia le Alpi Marittime e le Giulie.

Dall' aspetto oro-idrografico dell' Italia, ho dedotto e citato le località italiane più soggette, secondo la mia ipotesi generale, a terremoti. Se ne può concludere che in Italia le rotture interne od esterne, che danno luogo ai terremoti, si producono di preferenza nei rialzi di suolo, grandi o piccoli, il cui asse, essendo diretto verso il radiante (prossimamente l' Etna), fa ostacolo al movimento periodico giornaliero del suolo.

Presi in considerazione questi ritardi, la longitudine del radiante microsismico andrebbe a collocarsi 3° o 4° all' est di Roma, longitudine che coincide prossimamente con quella dell' Etna.

Earthquake of 12 March 1873 in the southern Marche –

43°07′54.55″N 13°03′49.79″E

Calendario Marzo 1873

6	**Gio**	◐ Alba: 06:36 - Tramonto: 18:06 - Luna: primo quarto alle ore 02.24. - Luna: 1.44 (tram.) 10.50 (lev.)

14	**Ven**	○ Alba: 06:23 - Tramonto: 18:15 - Luna piena alle ore 06.45. - Luna: 6.50 (tram.) 18.32 (lev.)

06.03.1873 First Quarter Moon 02h 24m

14.03.1873 Full Moon 06h 45m

(2h 24m)

Input interpretation

2 hours 24 minutes

Results

2.4 hours

144 minutes

Unit conversions

8640 seconds

8640 seconds = 2.4°

(6h 45m)

Input interpretation

6 hours 45 minutes

Results

6.75 hours

405 minutes

Unit conversions

24300 seconds

24300 seconds = 6.75°

From the above results, we obtain:

(2.4° + 6.75°)

Input interpretation

2.4° (degrees) + 6.75° (degrees)

Result

9.15° (degrees)

Unit conversions

160 mrad (milliradians)

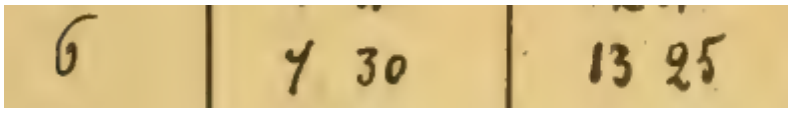
0.16 radians

---

9 degrees 9 arcminutes

9° 9’

Venice tides



B A

B A

(7h 30m)

Input interpretation

7 hours 30 minutes

Results

7.5 hours

450 minutes

Unit conversions

27 000 seconds

27000 seconds = 7.5°

(13h 25m)

Input interpretation

13 hours 25 minutes

Results

13.42 hours

805 minutes

Unit conversions

48 300 seconds

48300 seconds = 13.41666666667°

(18h 20m)

Input interpretation

18 hours 20 minutes

Results

18.33 hours

1100 minutes

Unit conversions

66 000 seconds

66000 seconds = 18.33333333333°

(1h 10m)

Input interpretation

1 hour 10 minutes

Results

1.167 hours

70 minutes

Unit conversion

4200 seconds

4200 seconds = 1.166666666667°

Ischia tides

06.03

(11h 50m)

Input interpretation

11 hours 50 minutes

Results

11.83 hours

710 minutes

Unit conversions

42 600 seconds

42600 seconds = 11.83333333333°

(24h 15m)

Input interpretation

24 hours 15 minutes

Results

1455 minutes

24.25 hours

Unit conversions

1 day 15 minutes

---

87 300 seconds

87300 seconds = 24.25°

From the following algebraic sum:

(7.5°+13.41666666667°-18.33333333333°-
1.166666666667°+11.83333333333°+24.25°+6.75°-2.4°)

Input interpretation

7.5° (degrees) + 13.41666666667° (degrees) − 18.33333333333° (degrees) −
1.166666666667° (degrees) + 11.83333333333° (degrees) +
24.25° (degrees) + 6.75° (degrees) − 2.4° (degrees)

Result

41.9° (degrees)

Unit conversions

730 mrad (milliradians)

0.73 radians

---

41 degrees 50 arcminutes

41° 50’

(13.416°)

Input interpretation

13.416° (degrees)

Unit conversions

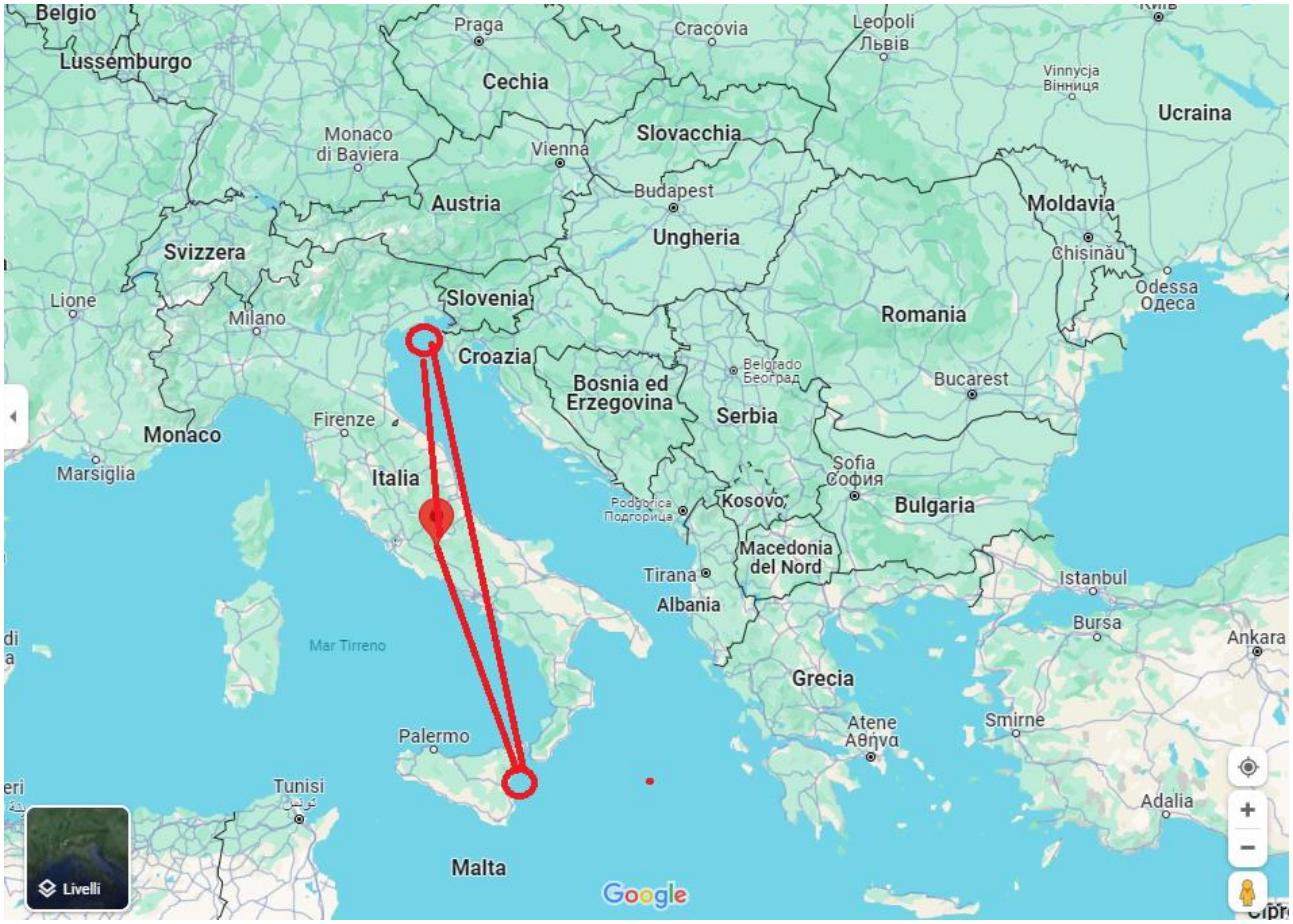
234.2 mrad (milliradians)

0.2342 radians

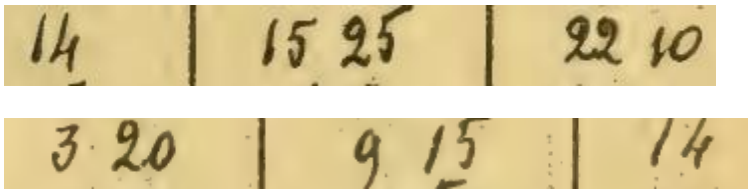
13 degrees 25 arcminutes

13° 25’

41° 50’ N 13° 25’ = Vico nel Lazio, Province of Frosinone



Venice tides 14.03.1873



(15h 25m)

Input interpretation

15 hours 25 minutes

Results

15.42 hours

925 minutes

Unit conversions

55 500 seconds

55500 seconds = 15.41666666667°

(22h 10m)

Input interpretation

22 hours 10 minutes

Results

1330 minutes

22.17 hours

Unit conversions

79 800 seconds

79800 seconds = 22.16666666667°

(3h 20m)

Input interpretation

3 hours 20 minutes

Results

3.333 hours

200 minutes

Unit conversions

12 000 seconds

12000 seconds = 3.333333333333°

(9h 15m)

Input interpretation

9 hours 15 minutes

Results

9.25 hours

555 minutes

Unit conversions

33 300 seconds

33300 seconds = 9.25°

Ischia tides

14.03

(7h 25m)

Input interpretation

7 hours 25 minutes

Results

7.417 hours

445 minutes

Unit conversions

26 700 seconds

26700 seconds = 7.416666666667°

(19h 40m)

Input interpretation

19 hours 40 minutes

Results

19.67 hours

1180 minutes

Unit conversions

70 800 seconds

70800 seconds = 19.66666666667°

(6h 45m)

Input interpretation

6 hours 45 minutes

Results

6.75 hours

405 minutes

Unit conversions

24 300 seconds

24300 seconds = 6.75° = 6° 45’

(-15.41666666667°+22.16666666667°-3.333333333333°+9.25°+7.416666666667°
+19.66666666667°+6.75°)-3.33°

Input interpretation

$$(-15.41666666667^\circ \text{ (degrees)} + 22.16666666667^\circ \text{ (degrees)} - 3.333333333333^\circ \text{ (degrees)} + 9.25^\circ \text{ (degrees)} + 7.416666666667^\circ \text{ (degrees)} + 19.66666666667^\circ \text{ (degrees)} + 6.75^\circ \text{ (degrees)}) - 3.33^\circ \text{ (degrees)}$$

Result

43.17° (degrees)

Unit conversions

753.5 mrad (milliradians)

0.7535 radians

---

43 degrees 10 arcminutes

(3.333333333333°+7.416666666667°)

Input interpretation

3.333333333333° (degrees) + 7.416666666667° (degrees)

Result

10.75° (degrees)

Unit conversions

187.6228945894 mrad (milliradians)

0.1876228945894 radians

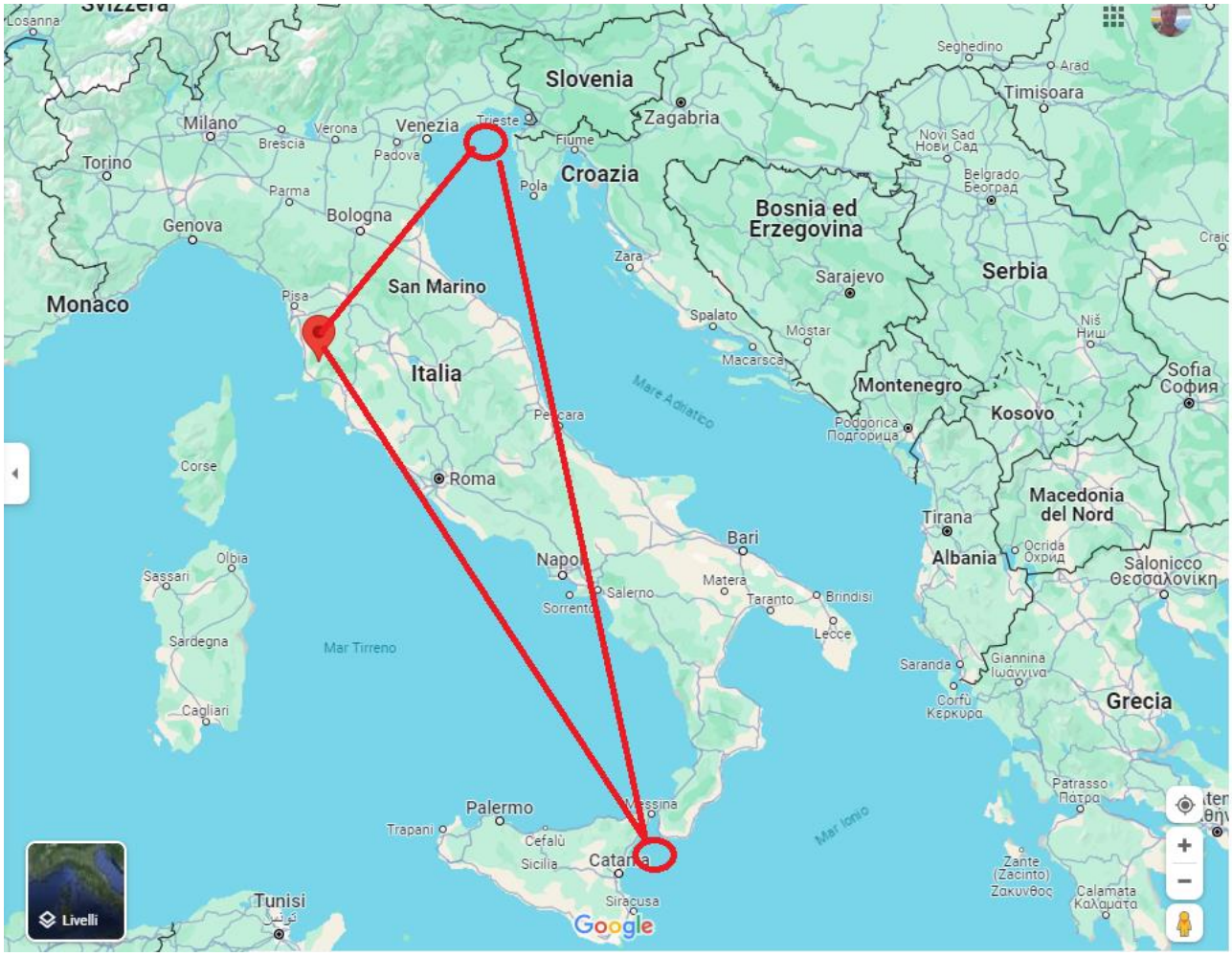
---

10 degrees 45 arcminutes

Earthquake of 12 March 1873 in the southern Marche –

43°07′54.55″N 13°03′49.79″E

43° 10’ N 10° 45’ E Monteverdi Marittimo, Province of Pisa



The total solar eclipse of April 16, 1874, is an astronomical event that took place on the aforementioned day around 2:00 pm UTC. The duration of the maximum phase of the eclipse was 4 minutes and 11 seconds, and the lunar shadow on the Earth's surface reached a width of 117 km;

Tipo	Totale
Gamma	-0.8364
Magnitudine	1.0569
Coordinate eclissi massima	39.9°S 0.9°W
Orari (UTC)	
Eclissi massima	14:00:53

Saros Cycle 117

The 117 series of the Saros cycle for solar eclipses occurs at the ascending node of the Moon, repeating every 18 years, 11 days, containing 71 events. The first eclipse of this series was on June 24, 792 AD. The final eclipse of this series will be on August 3, 2054

April 16, 1874 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Thursday, April 16, 1874 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Wednesday, June 23, 1982

Time difference from now (9:18:09 am)

42 years 23 days 5 hours 6 minutes 10 seconds ago

june 21, 1982+36 years 22 days 17 hours 24 minutes

Input interpretation

Monday, June 21, 1982 + 36 years 22 days 17 hours 24 minutes

Result

5:24 pm CEST | Friday, July 13, 2018

Time difference from now (9:22:36 am)

6 years 2 days 15 hours 58 minutes 37 seconds ago

The solar eclipse of July 13, 2018 is an astronomical event that took place on the aforementioned day around 3.02 UTC.

Tipo	Parziale
Gamma	-1.3542
Magnitudine	0.3365
Coordinate eclissi massima	67.9°S 127.4°E
Orari (UTC)	
Eclissi massima	3:02:16

2018-07-07 07:11	Monti Madonie
2018-07-14 02:50	Tirreno meridionale
2018-07-18 21:20	Etna - Versante occidentale

Etna 37°45′03.01″N 14°59′35.59″E

6 Luglio 2018	**Ultimo quarto**		16°26′

13 Luglio 2018	**LUNA NUOVA** alle 02:47 **Eclissi solare**		20°40′

(2h 47m)

Input interpretation

2 hours 47 minutes

Results

2.783 hours

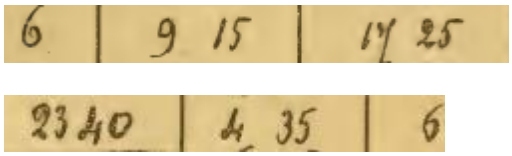
167 minutes

Unit conversions

10020 seconds

10020 seconds = 2.783333333333°

Venice tides - July



(9h 15m)

Input interpretation

9 hours 15 minutes

Results

9.25 hours

555 minutes

Unit conversions

33 300 seconds

33300 seconds = 9.25°

(17h 25m)

Input interpretation

17 hours 25 minutes

Results

17.42 hours

1045 minutes

Unit conversions

62 700 seconds

62700 seconds = 17.41666666667°

(23h 40m)

Input interpretation

23 hours 40 minutes

Results

23.67 hours

1420 minutes

Unit conversions

85 200 seconds

85200 seconds = 23.66666666667°

(4h 35m)

Input interpretation

4 hours 35 minutes

Results

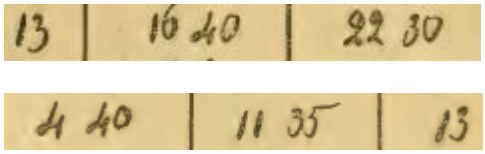
4.583 hours

275 minutes

Unit conversions

16 500 seconds

16500 seconds = 4.583333333333°



(16h 40m)

Input interpretation

16 hours 40 minutes

Results

16.67 hours

1000 minutes

Unit conversions

60 000 seconds

60000 seconds = 16.66666666667°

(22h 30m)

Input interpretation

22 hours 30 minutes

Results

22.5 hours

1350 minutes

Unit conversions

81 000 seconds

81000 seconds = 22.5°

(4h 40m)

Input interpretation

4 hours 40 minutes

Results

4.667 hours

280 minutes

Unit conversions

16 800 seconds

16800 seconds = 4.666666666667°

(11h 35m)

Input interpretation

11 hours 35 minutes

Results

11.58 hours

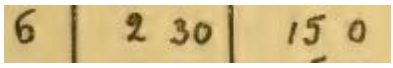
695 minutes

Unit conversions

41 700 seconds

41700 seconds = 11.58333333333°

Ischia tides - July



(2h 30m)

Input interpretation

2 hours 30 minutes

Results

2.5 hours

150 minutes

Unit conversions

9000 seconds

9000 seconds = 2.5°

(15h 00m)

Input interpretation

15 hours

Results

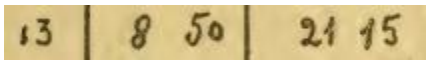
15 hours

900 minutes

Unit conversions

54 000 seconds

54000 seconds = 15°



(8h 50m)

Input interpretation

8 hours 50 minutes

Results

8.833 hours

530 minutes

Unit conversions

31 800 seconds

31800 seconds = 8.833333333333°

(21h 15m)

Input interpretation

21 hours 15 minutes

Results

1275 minutes

21.25 hours

Unit conversions

76500 seconds

76500 seconds = 21.25°

(9.25°+17.41666666667°+23.66666666667°+4.583333333333°-2.5°-15°)

Input interpretation

9.25° (degrees) + 17.41666666667° (degrees) + 23.66666666667° (degrees) + 4.583333333333° (degrees) − 2.5° (degrees) − 15° (degrees)

Result

37.42° (degrees)

Unit conversions

653 mrad (milliradians)

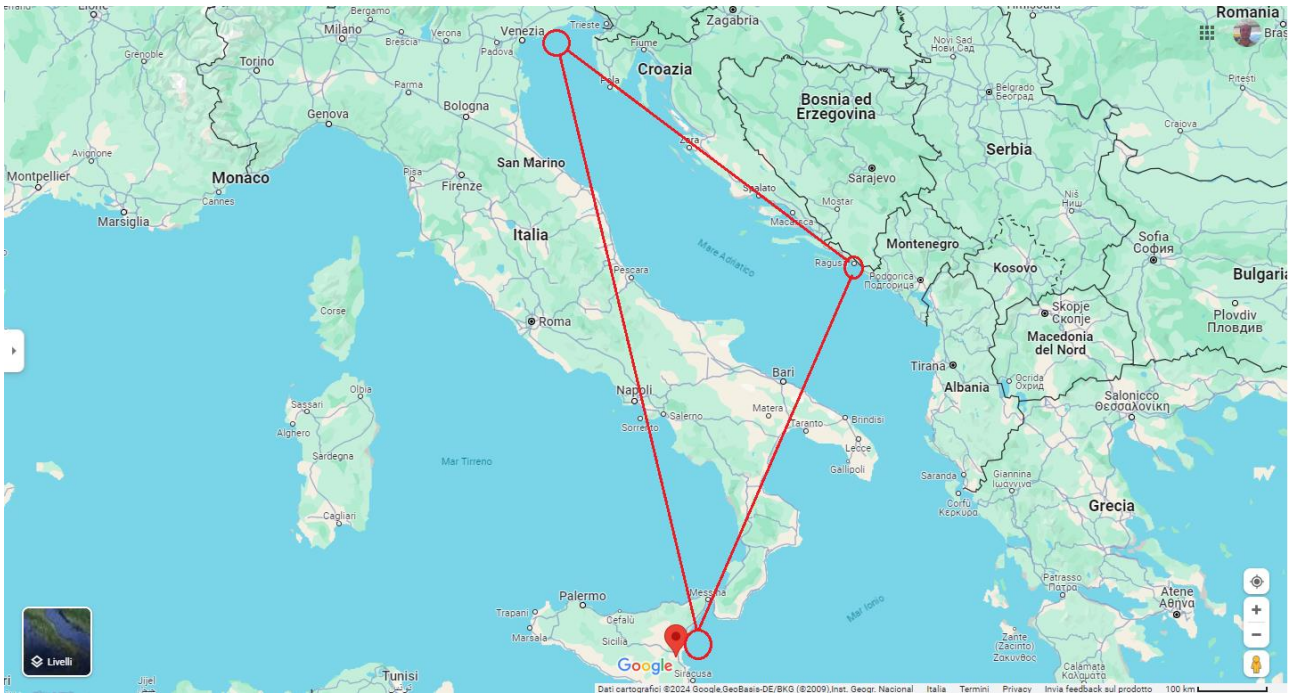
0.653 radians

---

37 degrees 25 arcminutes

37° 25’

37° 25’ N 15° 00’ E Catania, Metropolitan City of Catania



And:

(-2.783333333333°+16.66666666667°-
22.5°+4.666666666667°+11.58333333333°+8.833333333333°+21.25°)

Input interpretation

−2.783333333333° (degrees) + 16.66666666667° (degrees) −
22.5° (degrees) + 4.666666666667° (degrees) +
11.58333333333° (degrees) + 8.833333333333° (degrees) + 21.25° (degrees)

Result

37.72° (degrees)

Unit conversions

658.3 mrad (milliradians)

0.6583 radians

---

37 degrees 43 arcminutes

-2.783333333333°+16.66666666667°

Input interpretation

−2.783333333333° (degrees) + 16.66666666667° (degrees)

Result

13.8833333333° (degrees)

Unit conversions

242.309877819 mrad (milliradians)

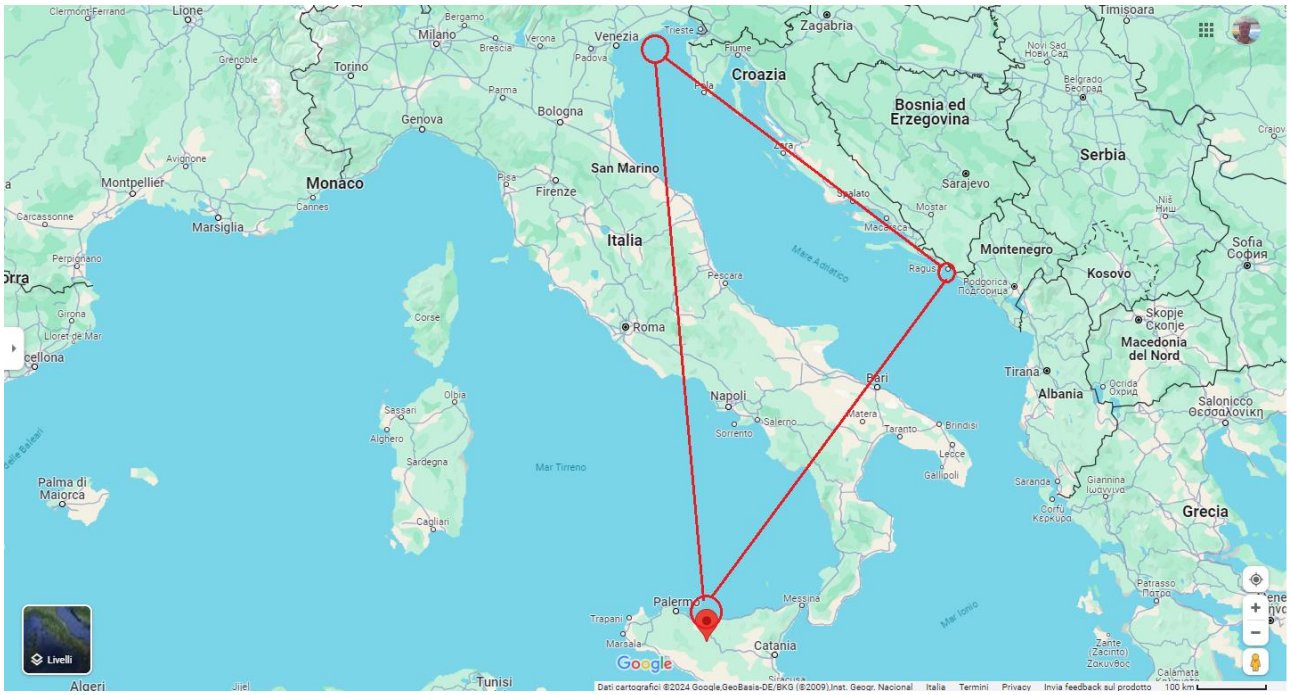
0.242309877819 radians

---

13 degrees 53 arcminutes

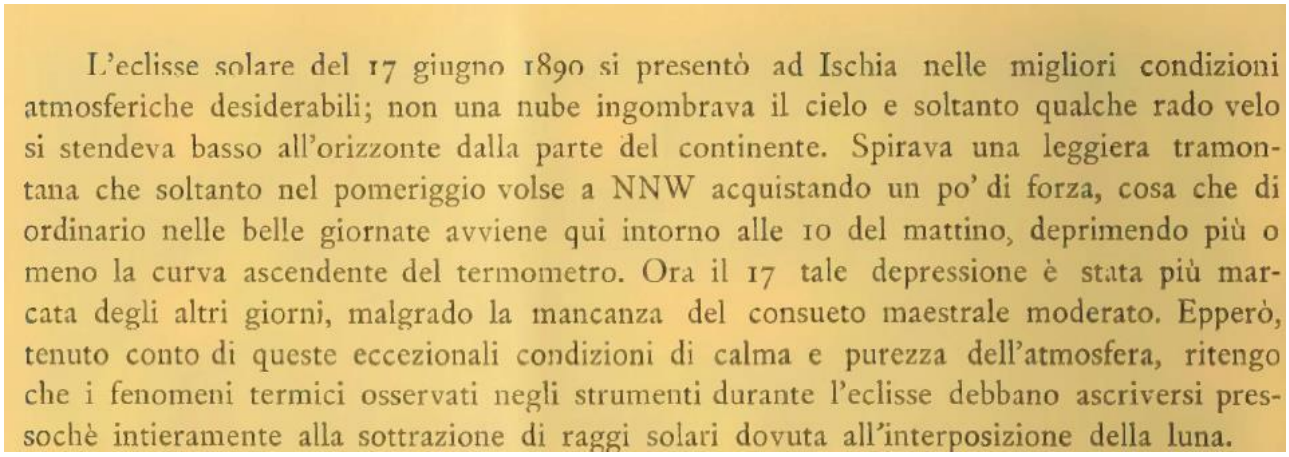
13° 53’

37° 43’ N 13° 53’ E Polizzi Generosa, Metropolitan City of Palermo



From

Sull'Eclisse del 17 giugno 1890, osservato ad Ischia – Nota del *Prof. Giulio Grablovitz*



L'eclisse solare del 17 giugno 1890 si presentò ad Ischia nelle migliori condizioni atmosferiche desiderabili; non una nube ingombrava il cielo e soltanto qualche rado velo si stendeva basso all'orizzonte dalla parte del continente. Spirava una leggiera tramontana che soltanto nel pomeriggio volse a NNW acquistando un po' di forza, cosa che di ordinario nelle belle giornate avviene qui intorno alle 10 del mattino, deprimendo più o meno la curva ascendente del termometro. Ora il 17 tale depressione è stata più marcata degli altri giorni, malgrado la mancanza del consueto maestrale moderato. Epperò, tenuto conto di queste eccezionali condizioni di calma e purezza dell'atmosfera, ritengo che i fenomeni termici osservati negli strumenti durante l'eclisse debbano ascriversi pressochè intieramente alla sottrazione di raggi solari dovuta all'interposizione della luna.

Jun 17, 1890 + 126 years 79 days 12 hours 54 minutes

Input interpretation

Tuesday, June 17, 1890 + 126 years 79 days 12 hours 54 minutes

Result

12:54 pm CEST | Sunday, September 4, 2016

September 4, 2016 + 354 days 8 hours 48 minutes 36 seconds

Input interpretation

Sunday, September 4, 2016 + 354 days 8 hours 48 minutes 36 seconds

Result

8:48:36 am CEST | Thursday, August 24, 2017

21 Agosto 2017	**LUNA NUOVA** alle 18:30 **Eclissi solare**		28°52′

The 2017 Casamicciola Terme earthquake hit the island of Ischia on the evening of August 21, 2017 with a magnitude of 3.9

40°45′N 13°55′E

(18h 30m)

Input interpretation

18 hours 30 minutes

Results

18.5 hours

1110 minutes

Unit conversions

66 600 seconds

66600 seconds = 18.5°

Ischia tides:

(5h 40m)

Input interpretation

5 hours 40 minutes

Results

5.667 hours

340 minutes

Unit conversions

20 400 seconds

20400 seconds = 5.666666666667°

(18h 5m)

Input interpretation

18 hours 5 minutes

Results

1085 minutes

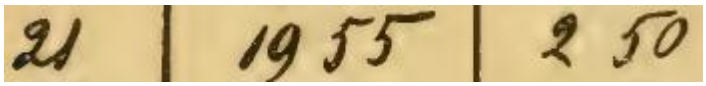
18.08 hours

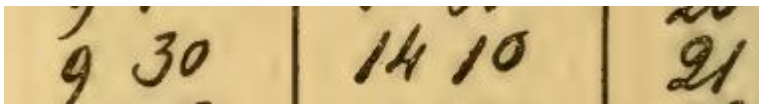
Unit conversions

65 100 seconds

65100 seconds = 18.08333333333°

Venice tides:





(19h 55m)

Input interpretation

19 hours 55 minutes

Results

19.92 hours

1195 minutes

Unit conversions

71 700 seconds

71700 seconds = 19.91666666667°

(2h 50m)

Input interpretation

2 hours 50 minutes

Results

2.833 hours

170 minutes

Unit conversions

10 200 seconds

10200 seconds = 2.833333333333°

(9h 30m)

Input interpretation

9 hours 30 minutes

Results

9.5 hours

570 minutes

Unit conversions

34 200 seconds

34200 seconds = 9.5°

(14h 10m)

Input interpretation

14 hours 10 minutes

Results

850 minutes

14.17 hours

Unit conversions

51 000 seconds

51000 seconds = 14.16666666667°

We obtain:

(-18.5°-5.666666666667°+18.08333333333°+19.91666666667°+2.833333333333°+9.5°+14.16666666667°)

Input interpretation

$$-18.5^\circ \text{ (degrees)} - 5.666666666667^\circ \text{ (degrees)} + 18.08333333333^\circ \text{ (degrees)} + 19.91666666667^\circ \text{ (degrees)} + 2.833333333333^\circ \text{ (degrees)} + 9.5^\circ \text{ (degrees)} + 14.16666666667^\circ \text{ (degrees)}$$

Result

40.3° (degrees)

Input interpretation

40.3° (degrees)

Unit conversions

703.4 mrad (milliradians)

0.7034 radians

---

40 degrees 18 arcminutes

40° 18’

14.16666666667°

Input interpretation

14.16666666667° (degrees)

Unit conversions

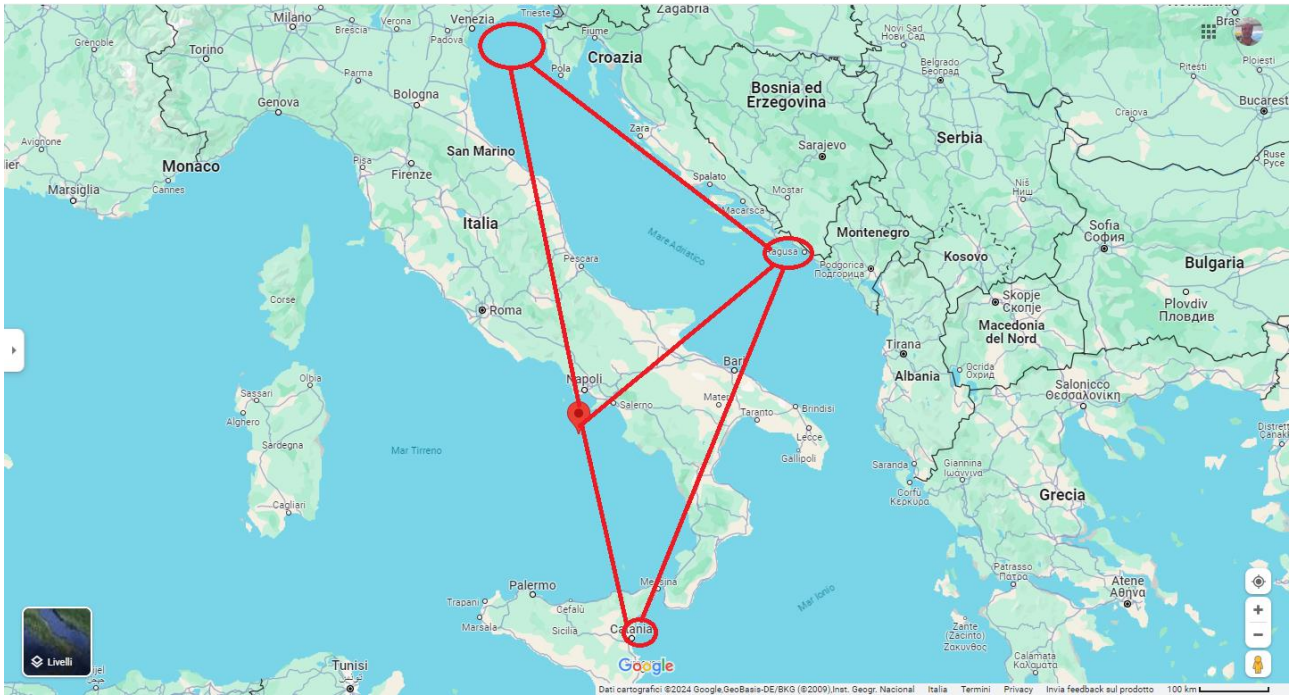
247.254977366 mrad (milliradians)

0.247254977366 radians

---

14 degrees 10 arcminutes

40° 18’ N 14° 10’ E Tyrrhenian Sea



Observations and conclusions

Electromagnetic phenomena accompany periods of earthquakes, and which at that time often take the place of telluric motions. In addition to this, they predominate every year during one or two months which chooses between March and May or, at the latest, enters June and July. **The activity of the sun is the center of electromagnetic phenomena** (Michele Stefano De Rossi – "Meteorologia Endogena")

Recall that tidal force (generally used in the plural, tidal forces or tidal forces, and also with the expression tidal effects) is a secondary effect of the **force of gravity**. Tidal effects from different bodies can add up, as in the case of the alignment between the Moon and the Sun which gives rise to intense syzygial tides.

The undoubted correlation that Prof. De Rossi felt between the Corleone earthquakes and those of Monte Baldo last year moved me to pay special attention to the latter as well. Rummaging through the scientific yearbooks, I found the precise dates of the strongest earthquakes felt in 1866 on the slopes of Monte Baldo, namely: 13 June, 11 August and 7-8 November, which correspond to the new moons; in 1870 seismic activity reawakened there, but I don't know the dates; in 1876 the first strong shock occurred on April 23, that is, on the eve of the new moon; with the perigee (which took place on the 26th) the shocks prepared by the new moon continued until the 29th; then the frequency decreased until May 4th and it already seemed to have left those populations in peace; except that the next coincidence of the new moon with the perigee and with a strong northern declination (in which position, as I already said, one of the two passages to the meridian is an energetic occasion for an earthquake) provided me with such a clue of awakening, probably on a greater extent of land , that here I prepared myself for careful surveillance, so as not to miss the most important phases of the phenomenon, when this happened. I mentioned this probability to Prof. Don Timoteo Bertelli of Florence in my letter of May 1st and to Prof. Goiran of Verona in a letter of the same 12th. The critical day otherwise passed peacefully in Trieste; not so in Monte Baldo, where the tremors resumed on the 22nd and continued on the 23rd, to be repeated on the 29th; at the same time in Corleone the activity, which had seemed almost extinguished since the 10th, was reawakened with a shock on the 20th, one on the 21st, four on the 24th and with great energy on the 25th. On May 22nd, the eve of the new moon, the very strong earthquake also occurred of Spoleto and at the time of the new moon in question there was, it can be said, no region of the Apennines in which seismic activity did not manifest itself with greater or lesser force, as can be seen from the bulletin.

In Monte Baldo there was a truce during June; in July the tremors resumed the day after the full moon and continued thereafter without interruption; in the following months tremors were noted on August 7th, September 5th, October 9th and November 4th, that is, almost always one or two days after the full moon. It is remarkable that on May 22nd and 23rd, while the rest of Italy was shaking, there was a truce in Corleone and then an immediate awakening, and the truce that occurred in the new moons following Monte Baldo in the face of energy is equally significant. manifested itself at the same time as Corleone, where the endogenous forces were transported by geological-mechanical effects, which it is not my task to erudite. In 1870, as far as I can remember, the seismic period of Monte Baldo put an end to that of Monte Nevoso (Julian Alps). This began on February 28th with a strong tremor at 12.20 pm; the next day the shocks were repeated and so also on the day of the new moon, March 2, and the following; after a fifteen-day truce a shock was felt at the full moon; then there were other tremors, the dates of which I could not know; those that came to my attention, and were the strongest, occurred on April 28th (the eve of the new moon), on May 10th, on May 15th (full moon), on June 2nd (near the new moon) and several between the 13th and the 19th. June (full moon period). Then the activity died down there and arose in Monte Baldo. Monte Nevoso was frequently subject to earthquakes; in relatively recent times there was a long period from November 1750 to May 1753; and in 1838 the populations remained in suspense for three months. That local area includes the city of Rijeka; and even in the small earthquakes, which occur here from time to time, I have observed a decided prevalence of syzygies. From this we see that some seismic periods, although limited within very narrow boundaries, can be the effect of a large telluric cause. I took the Corleone period into special consideration, because this is one of the few whose phases have been carefully studied and from which there is a sufficiently large number of shocks to draw positive consequences. There was another seismic period of recent memory and well studied, that of Belluno; the existing relationship between it and the lunar positions has no need of my demonstrations, because the illustrious Falb proved it since he predicted, based on his theories, the return of the phenomenon even during the course of the period itself.

Perhaps all the seismic phenomena that occur in Italy have as their cause, if not direct, at least determining, the action of the stars, but while on the one hand the lack of sufficient observations does not allow very extensive studies, on the other hand the translocation, which often happens, seismic centers distract the attention of investigators so as not to allow them to glimpse the effects of a great common cause in isolated phenomena.

It is desirable that the invitation made repeatedly by Prof. Cav. De Rossi, in order to obtain the greatest possible number of reports on seismic phenomena, must be listened to by those who have the progress of science at heart and that no one abstains from communicating even crude observations of such phenomena, the memory of which without this could be lost to the detriment of science. (**DELL' ATTRAZIONE LUNI- SOLARE IN RELAZIONE COI FENOMENI MAREO – SISMICI** - STUDI DIMOSTRATIVI DI GIULIO GRABLOVITZ – 1877)

In conclusion:

While **the activity of the sun is the center of electromagnetic phenomena,** the tidal force, hence the luni-solar attraction, is a secondary effect of the **force of gravity**. The **aurora borealis**, for example, is a phenomenon visually characterized by luminous bands that take on a wide range of shapes and colours, rapidly changing in time and space, usually red-green-blue in colour, called auroral arcs, caused from the interaction of charged particles (protons and electrons) of solar origin (solar wind) with the terrestrial ionosphere (atmosphere between 100-500 km): these particles excite the atoms of the atmosphere which, subsequently de-energizing, emit light of various lengths 'wave. Solar activity is a source of emission of **electromagnetic waves** and **electrically charged particles**, the luni-solar attraction, is a secondary effect of the **force of gravity**. It is therefore possible to hypothesize a connection, albeit indirect, between these phenomena and "**gravitational waves**" which, among other things, travel at a speed equal to c (speed of light), as well as **electromagnetic waves**. Thus, there is a purely mathematical connection between seismic waves and gravitational waves.

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

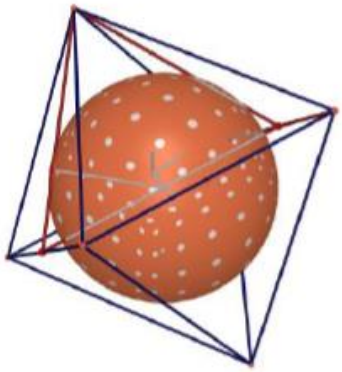


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\ l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.141939571526584308924330732196162632677513386811659044682541739 3

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^{0}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$
$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x\in\mathbb{R}\ \text{and}\ x<0)$

$$\frac{\left(6\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor \arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

$4096 = 64^2$, (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$).

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.61805\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^8\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^8\right)^k}{k!}\right)\quad\text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$
$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi e^{0} \approx 3.1416$ (real, principal root)

$\pi e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1\sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003$ (real, principal root)

$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003$ (real root)

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\,\pi\left\lfloor\frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{8}{\pi^2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$n!$ is the factorial function

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$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\mathrm{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13

…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\Big/\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}(C\times \mathrm{R}\times 2.33\cdot 10^{-13})}}\cong 1.61803398\ldots=\frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.6180359123482642354401744088347098542545273508401733563064818107 …

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\, x^2\, y\, z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$ is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.6018401361\times 10^{-24}\right)}}$$

1.618032997307532491506757016629746746422577260892967140791939590 3
…

1.6180329973075…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.4525642121\times 10^{-24}\right)}}$$

Result

1.644932352102092130483898983704151168876621841655166877914166033 8
…

1.64493235210209213…. ≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

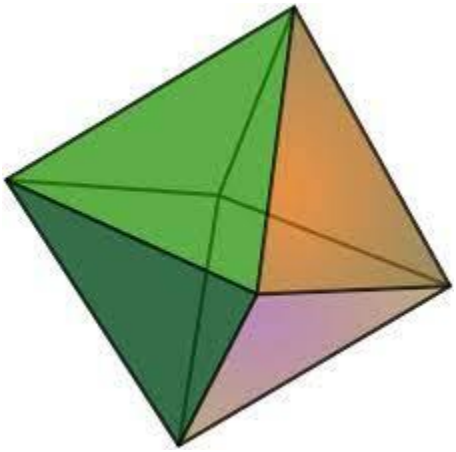
Result

3.14159225731469939939950039231605796469731171781644423955790024797

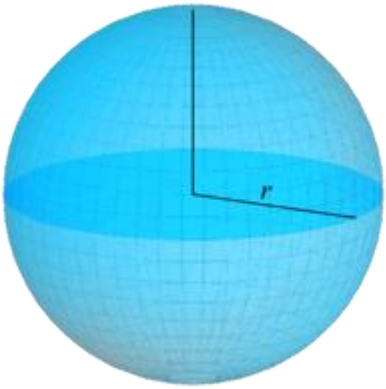
…

3.14159225731469…. ≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find a, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

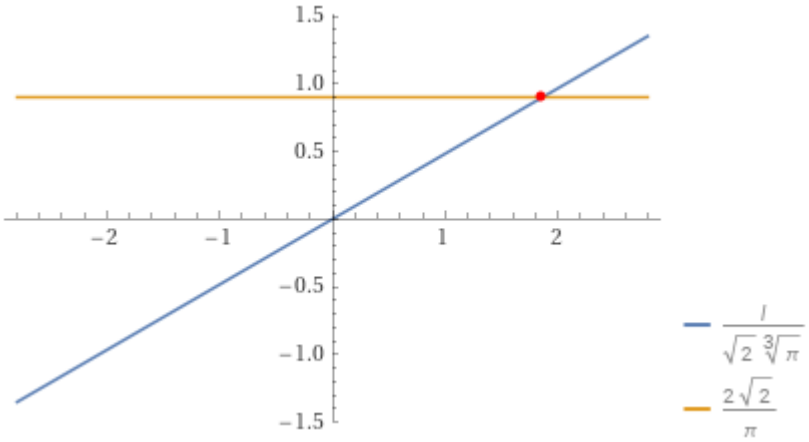
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,3}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 =$$

$$\frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **$f_0(1710)$ scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256x^8 + 95\,744x^7 - 3\,248\,750\,080x^6 - 914\,210\,725\,504x^5 + 15\,498\,355\,554\,921\,184x^4 + 2\,911\,478\,392\,539\,914\,656x^3 - 32\,941\,144\,911\,224\,677\,091\,680x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

$1.64381856858\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\wedge(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-\right.\right.\right.\right.$$
$$\left.\left.\left.\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\right/\right.$$
$$\left.\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\text{^}(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-\right.\right.\right.\right.$$
$$\left.\left.\left.\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\right/\right.$$
$$\left.\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\text{^}(1/15)\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)}\quad\text{for } (0<\gamma<-\operatorname{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

–5.010882647757...

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t} \, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757 \ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\,\sqrt{6}}\right)^2\right\} = 0$$

for $b = -\frac{226\,802\,245}{18\,480\,874}$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

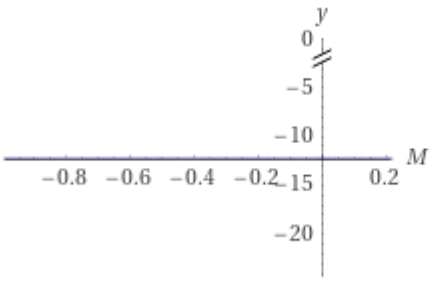
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

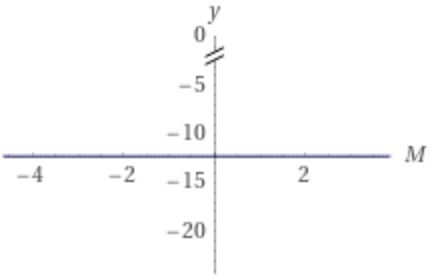
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V = \frac{1}{3}(0.0814845\,b + 1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

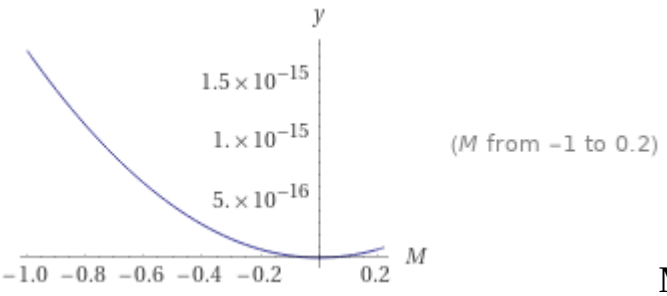
Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\,M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

Result:

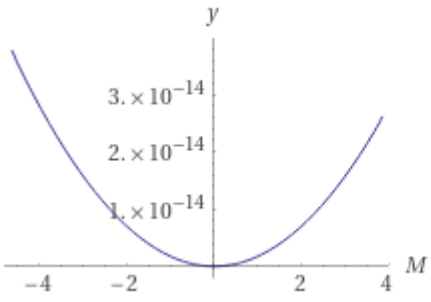
0

Plots: **(possible mathematical connection with an open string)**



M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O(M^{62194})$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{1}{3}M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2\left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^{-16}

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times 10^{-17}$

7.021621519159*10^-17

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

1.57986484181*10^-14

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 2^2 + 6.58545 \times 10^{-10}\sqrt{2^4}\right)}{2^2} + 1\right)^2 \times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

7.021621519*10^-15

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_{0}}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)])))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\,\hat{}\,(1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

5.729475 * 10^{-35} Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

1.820306 * 10^{61} V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

5.975498*10^{-8} V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

1.042940*10^{27} V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

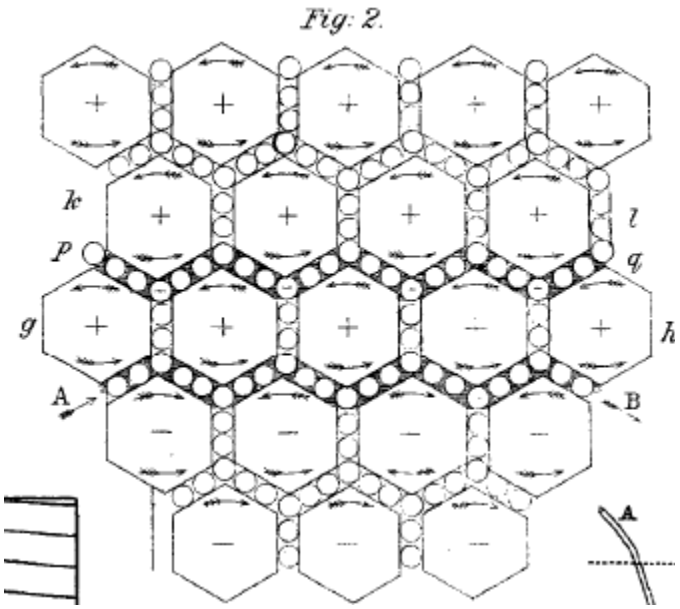
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

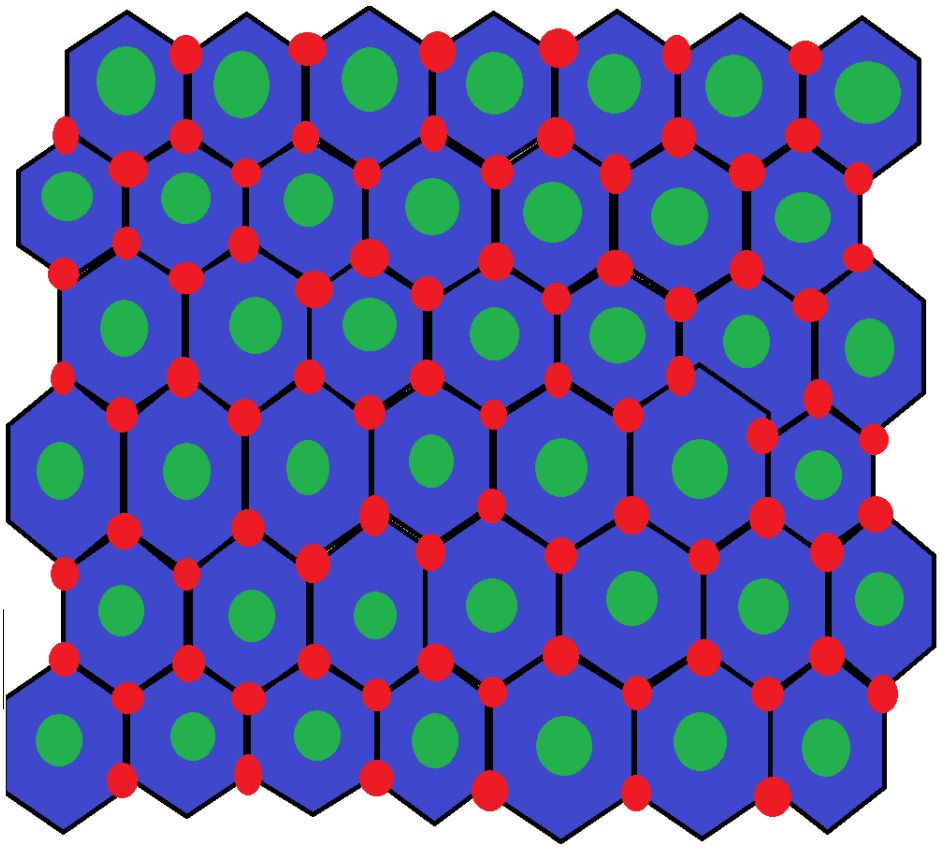
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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An Update on Brane Supersymmetry Breaking - *Jihad Mourad and Augusto Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On some equations concerning the trigonometry, the seismology and the calculation relating to the tides. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory XI

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper (part XI), we analyze some equations concerning the trigonometry, the seismology and the calculation relating to the tides. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory

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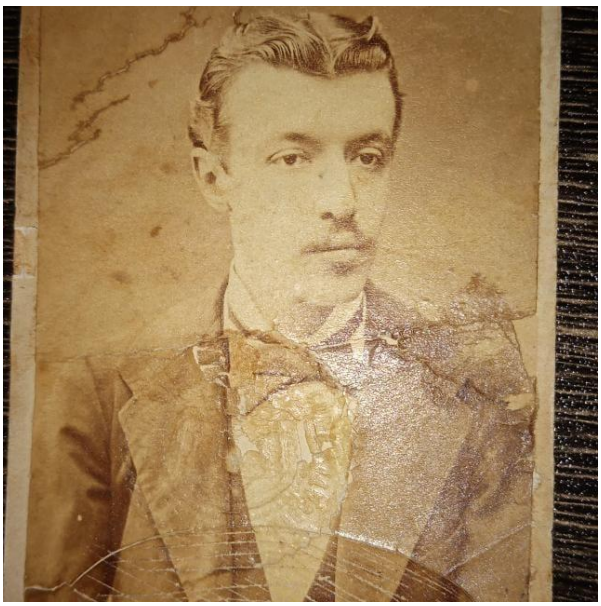
A. Nardelli studied at the Università degli Studi di Napoli Federico II - Dipartimento di Studi Umanistici – **Sezione Filosofia - scholar of Theoretical Philosophy**

Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

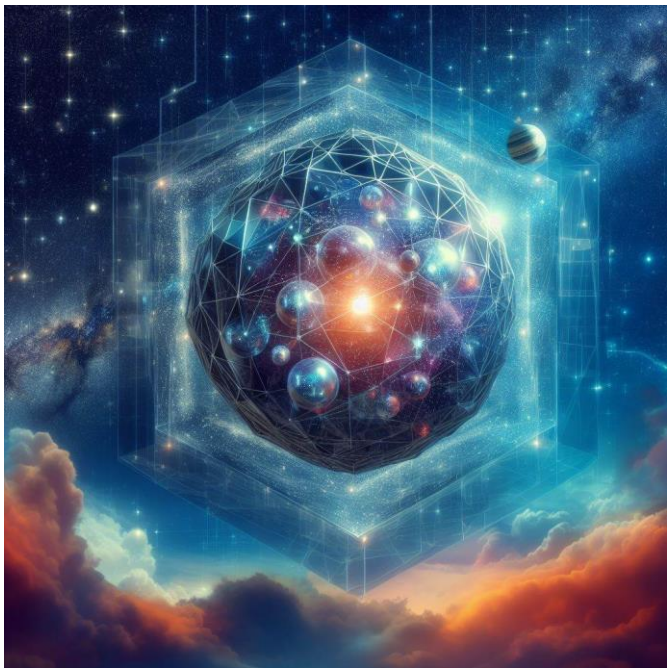
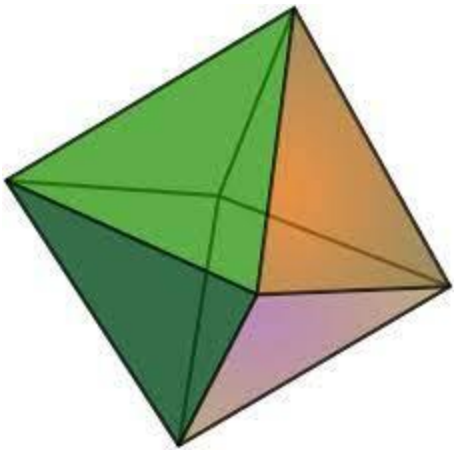
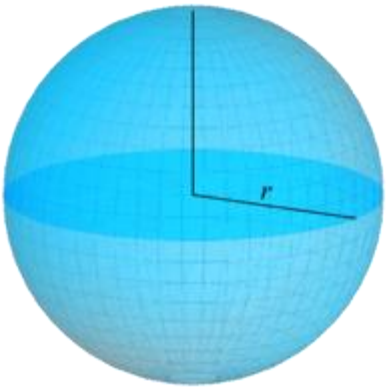


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\pi x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$l = 0, \quad x = 0$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt{2}\ \sqrt[3]{\pi}\right) = \log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\ \pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

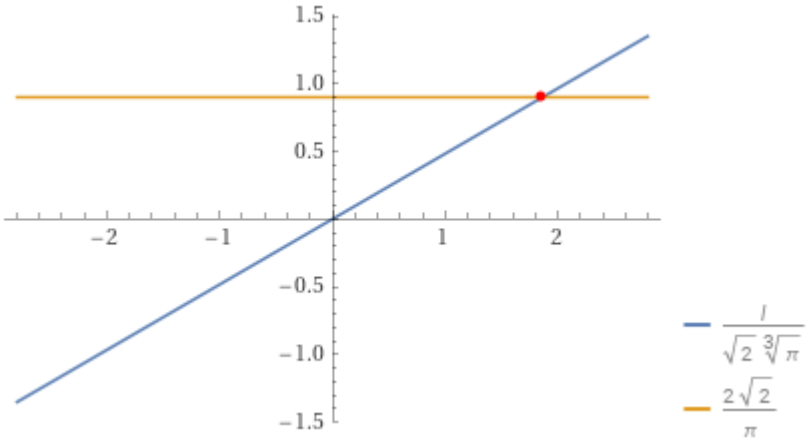
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

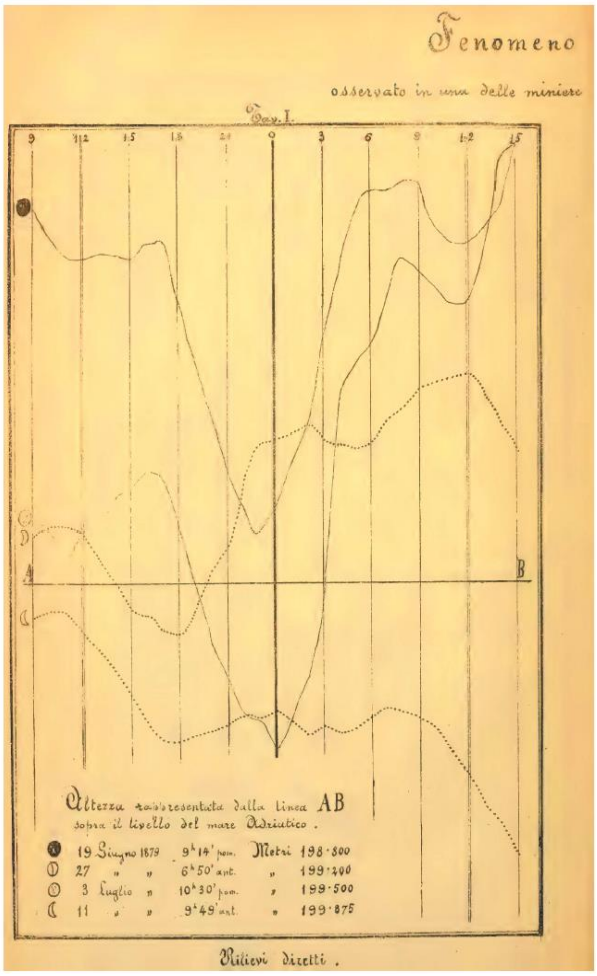
Plot

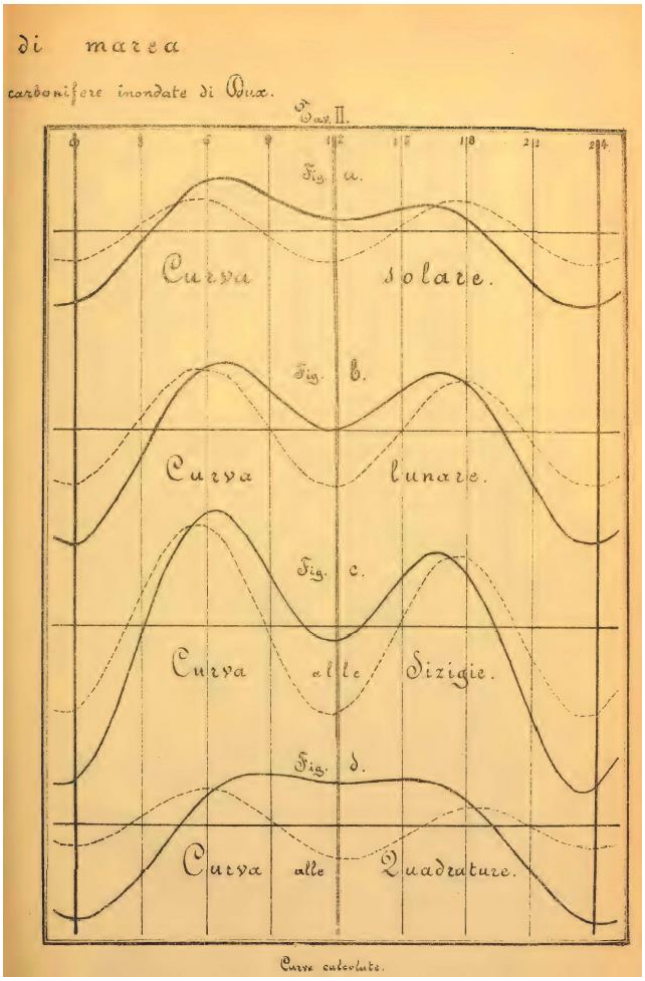


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

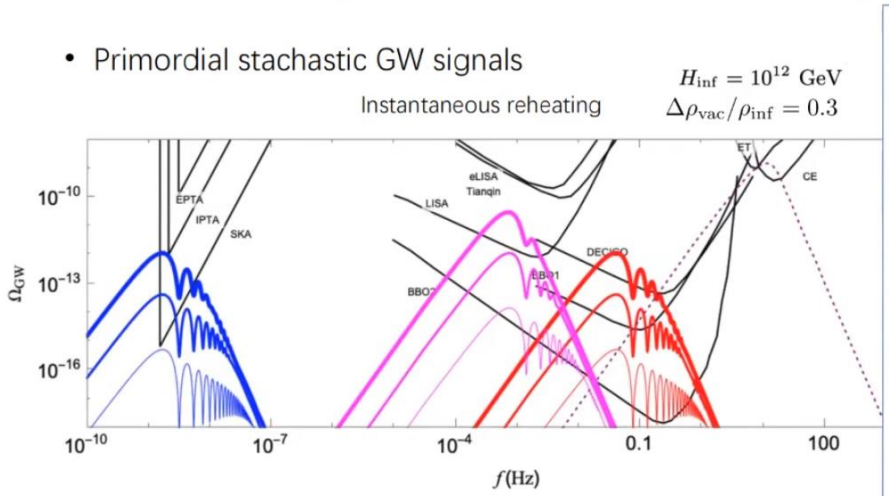

di marea
carbonifere inondate di Pux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

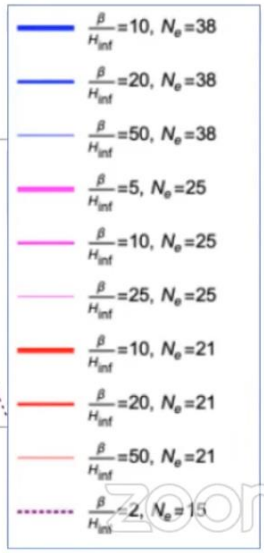
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

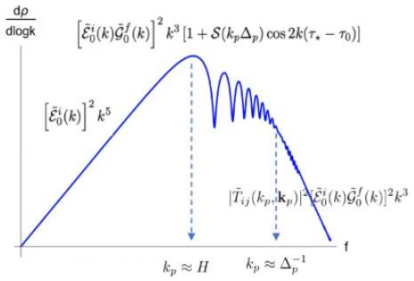
Comparison between primary GW and secondary GW

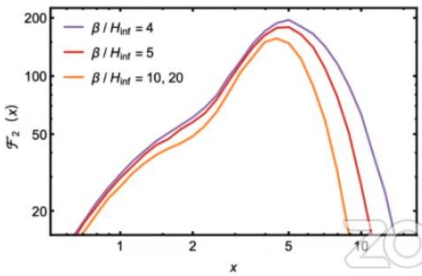
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





From

Umberto Forti – **Trigonometria**

We analyze the following equation:

3 sin x = 2 cos x

(3 sin x)/cos x = (2 cos x)/cos x

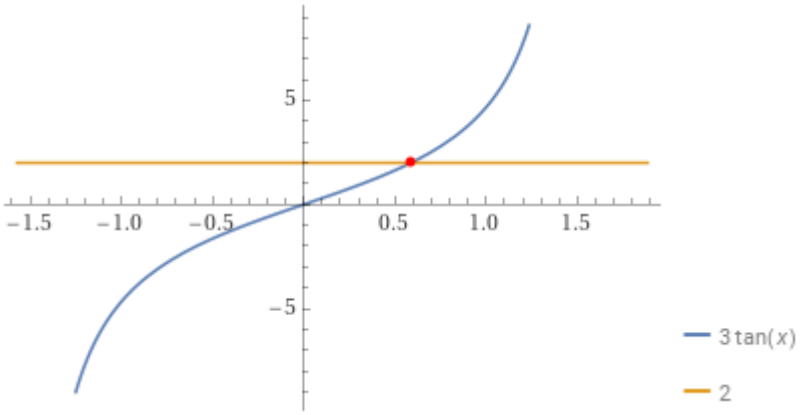
Input

$$\frac{3\sin(x)}{\cos(x)} = \frac{2\cos(x)}{\cos(x)}$$

Result

$$3\tan(x) = 2$$

Plot **(figure that can be related to an open string)**



Alternate form assuming x is real

$$\frac{3\sin(2x)}{\cos(2x)+1} = 2$$

Alternate form

$$\frac{3\,i\left(e^{-i\,x}-e^{i\,x}\right)}{e^{-i\,x}+e^{i\,x}}=2$$

Solution

$$x=\pi\,n+\tan^{-1}\left(\frac{2}{3}\right),\quad n\in\mathbb{Z}$$

$\tan^{-1}(x)$ is the inverse tangent function

$\mathbb{Z}$ is the set of integers

From the solution

$$x=\pi\,n+\tan^{-1}\left(\frac{2}{3}\right),\quad n\in\mathbb{Z}$$

for n = 8:

8π + tan^(-1)(2/3)

Input

$$8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Exact Result

$$8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)$$

(result in radians)

Decimal approximation

25.720743832265913458946758146861108501179062441056770921525603946

…

(result in radians)

25.7207438322….

Alternate form

$$8\pi + \frac{1}{2} i \log\left(1 - \frac{2i}{3}\right) - \frac{1}{2} i \log\left(1 + \frac{2i}{3}\right)$$

log(x) is the natural logarithm

Alternative representations

$$8\pi + \tan^{-1}\left(\frac{2}{3}\right) = 8\pi + \text{sc}^{-1}\left(\frac{2}{3}\middle|0\right)$$

$$8\pi + \tan^{-1}\left(\frac{2}{3}\right) = 8\pi + \cot^{-1}\left(\frac{1}{\frac{2}{3}}\right)$$

$$8\pi + \tan^{-1}\left(\frac{2}{3}\right) = 8\pi + \tan^{-1}\left(1, \frac{2}{3}\right)$$

$\text{sc}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function sc

$\cot^{-1}(x)$ is the inverse cotangent function

$\tan^{-1}(x, y)$ is the inverse tangent function

Series representations

$$8\pi + \tan^{-1}\left(\frac{2}{3}\right) = 8\pi + \sum_{k=0}^{\infty} \frac{\left(\frac{3}{2}\right)^{-1-2k} e^{i k \pi}}{1 + 2k}$$

$$8\pi + \tan^{-1}\left(\frac{2}{3}\right) = 8\pi + \frac{1}{2}\,i\log\left(\frac{1}{2} - \frac{i}{3}\right) + \frac{1}{2}\,i\sum_{k=1}^{\infty}\frac{\left(\frac{1}{2} - \frac{i}{3}\right)^k}{k}$$

$$8\pi + \tan^{-1}\left(\frac{2}{3}\right) = 8\pi - \frac{1}{2}\,i\log\left(\frac{1}{2} + \frac{i}{3}\right) - \frac{1}{2}\,i\sum_{k=1}^{\infty}\frac{\left(\frac{1}{2} + \frac{i}{3}\right)^k}{k}$$

Integral representations

$$8\pi + \tan^{-1}\left(\frac{2}{3}\right) = 8\pi + 6\int_0^1 \frac{1}{9 + 4\,t^2}\,dt$$

$$8\pi + \tan^{-1}\left(\frac{2}{3}\right) = 8\pi - \frac{i}{6\,\pi^{3/2}}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(\frac{9}{13}\right)^s \Gamma\left(\frac{1}{2} - s\right)\Gamma(1-s)\,\Gamma(s)^2\,ds \quad \text{for } 0 < \gamma < \frac{1}{2}$$

$$8\pi + \tan^{-1}\left(\frac{2}{3}\right) = 8\pi - \frac{i}{6\,\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\left(\frac{9}{4}\right)^s \Gamma\left(\frac{1}{2} - s\right)\Gamma(1-s)\,\Gamma(s)}{\Gamma\left(\frac{3}{2} - s\right)}\,ds \quad \text{for } 0 < \gamma < \frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representations

$$8\pi+\tan^{-1}\left(\frac{2}{3}\right)=8\pi+\cfrac{2}{3\left(1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\,\frac{\frac{4k^2}{9}}{1+2k}\right)}=8\pi+\cfrac{2}{3\left(1+\cfrac{4}{9\left(3+\cfrac{16}{9\left(5+\cfrac{4}{7+\cfrac{64}{9\,(9+\ldots)}}\right)}\right)}\right)}$$

$$8\pi+\tan^{-1}\left(\frac{2}{3}\right)=8\pi+\cfrac{2}{3\left(1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\,\frac{\frac{4}{9}(1-2k)^2}{\frac{1}{9}(13+10k)}\right)}=$$

$$8\pi+\cfrac{2}{3\left(1+\cfrac{4}{9\left(\frac{23}{9}+\cfrac{4}{\frac{11}{3}+\cfrac{100}{9\left(\frac{43}{9}+\cfrac{196}{9\left(\frac{53}{9}+\ldots\right)}\right)}}\right)}\right)}$$

$$8\pi+\tan^{-1}\left(\frac{2}{3}\right)=\frac{2}{3}+8\pi-\frac{8}{27\left(3+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{4}{9}\left(1+(-1)^{1+k}+k\right)^2}{3+2k}\right)}=$$

$$\frac{2}{3}+8\pi-\cfrac{8}{27\left(3+\cfrac{4}{5+\cfrac{16}{9\left(7+\cfrac{100}{9\left(9+\cfrac{64}{9\,(11+\ldots)}\right)}\right)}}\right)}$$

$$8\pi+\tan^{-1}\left(\frac{2}{3}\right)=8\pi+\frac{6}{13+9\left(\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{8}{9}\left(1-2\left\lfloor\frac{1+k}{2}\right\rfloor\right)\left\lfloor\frac{1+k}{2}\right\rfloor}{\frac{1}{9}\left(11+2(-1)^k\right)(1+2k)}\right)}=$$

$$8\pi+\cfrac{6}{13+9\left(-\cfrac{8}{9\left(3-\cfrac{8}{9\left(\frac{65}{9}-\cfrac{16}{3\left(7-\cfrac{16}{3\,(13+\ldots)}\right)}\right)}\right)}\right)}$$

$\underset{k=k_1}{\overset{k_2}{\mathrm{K}}}\ a_k\,/\,b_k$ is a continued fraction

$\lfloor x \rfloor$ is the floor function

From which:

(233+3)*1/((2e(8π + tan^(-1)(2/3))+4))+7/2(MRB const)^(1-1/(4π)+π)

Input

$$(233+3)\times\frac{1}{2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4}+\frac{7}{2}\,C_{\text{MRB}}{}^{1-1/(4\,\pi)+\pi}$$

$\tan^{-1}(x)$ is the inverse tangent function

C_{MRB} is the MRB constant

Exact Result

$$\frac{7}{2}\,C_{\text{MRB}}{}^{1-1/(4\,\pi)+\pi}+\frac{236}{4+2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)}$$

(result in radians)

Decimal approximation

1.64472768242760943694973217377965855555590060592777247725044137 85

…

(result in radians)

1.6447276824276…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$\frac{7}{2}\,C_{\text{MRB}}{}^{1-1/(4\,\pi)+\pi}+\frac{118}{2+8\,e\,\pi+e\,\tan^{-1}\left(\frac{2}{3}\right)}$$

$$\frac{7}{2}\,C_{\text{MRB}}{}^{1-1/(4\,\pi)+\pi}+\frac{118}{2+e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)}$$

$$\frac{7}{2} {C_{\text{MRB}}}^{1-1/(4\pi)+\pi} + \frac{236}{4 + 2e\left(8\pi + \frac{1}{2} i \left(\log\left(1 - \frac{2i}{3}\right) - \log\left(1 + \frac{2i}{3}\right)\right)\right)}$$

log(x) is the natural logarithm

12(((2e(8π + tan^(-1)(2/3))+4)))+3

Input

$$12\left(2e\left(8\pi + \tan^{-1}\left(\frac{2}{3}\right)\right) + 4\right) + 3$$

$\tan^{-1}(x)$ is the inverse tangent function

Exact Result

$$3 + 12\left(4 + 2e\left(8\pi + \tan^{-1}\left(\frac{2}{3}\right)\right)\right)$$

(result in radians)

Decimal approximation

1728.98953376876394060959436655228943636148908667528027807345813 11

…

(result in radians)

1728.98953376876…

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number).

Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternate forms

$$51 + 24\, e\left(8\,\pi + \tan^{-1}\left(\frac{2}{3}\right)\right)$$

$$3\left(17+64\,e\,\pi+8\,e\,\tan^{-1}\left(\frac{2}{3}\right)\right)$$

$$51+e\left(192\,\pi+24\,\tan^{-1}\left(\frac{2}{3}\right)\right)$$

Expanded form

$$51+192\,e\,\pi+24\,e\,\tan^{-1}\left(\frac{2}{3}\right)$$

Alternative representations

$$12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3=3+12\left(4+2\,e\left(8\,\pi+\text{sc}^{-1}\left(\frac{2}{3}\,\middle|\,0\right)\right)\right)$$

$$12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3=3+12\left(4+2\,e\left(8\,\pi+\cot^{-1}\left(\frac{1}{\frac{2}{3}}\right)\right)\right)$$

$$12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3=3+12\left(4+2\,e\left(8\,\pi+\tan^{-1}\left(1,\,\frac{2}{3}\right)\right)\right)$$

$\text{sc}^{-1}(x\mid m)$ is the inverse of the Jacobi elliptic function sc

$\cot^{-1}(x)$ is the inverse cotangent function

$\tan^{-1}(x, y)$ is the inverse tangent function

Series representations

$$12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3=51+192\,e\,\pi+24\,e\sum_{k=0}^{\infty}\frac{\left(\frac{3}{2}\right)^{-1-2k}\,e^{i\,k\,\pi}}{1+2\,k}$$

$$12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3=$$
$$51+192\,e\,\pi-12\,i\,e\log\left(\frac{1}{2}+\frac{i}{3}\right)-12\,i\,e\sum_{k=1}^{\infty}\frac{\left(\frac{1}{2}+\frac{i}{3}\right)^k}{k}$$

$$12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3=$$
$$51+192\,e\,\pi+12\,i\,e\log\left(\frac{1}{2}-\frac{i}{3}\right)+12\,i\,e\sum_{k=1}^{\infty}\frac{\left(\frac{1}{2}-\frac{i}{3}\right)^k}{k}$$

$\log(x)$ is the natural logarithm

Integral representations

$$12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3=51+192\,e\,\pi+144\,e\int_0^1\frac{1}{9+4\,t^2}\,dt$$

$$12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3=$$
$$51+192\,e\,\pi-\frac{4\,i\,e}{\pi^{3/2}}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(\frac{9}{13}\right)^s\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)^2\,ds\quad\text{for } 0<\gamma<\frac{1}{2}$$

$$12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3=$$
$$51+192\,e\,\pi-\frac{4\,i\,e}{\pi}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\left(\frac{9}{4}\right)^s\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds\quad\text{for } 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representations

$$12\left(2e\left(8\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3=51+16e\left(12\pi+\frac{1}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{4k^2}{9}}{1+2k}}\right)=$$

$$51+16e\left(12\pi+\cfrac{1}{1+\cfrac{4}{9\left(3+\cfrac{16}{9\left(5+\cfrac{4}{7+\cfrac{64}{9(9+\ldots)}}\right)}\right)}}\right)$$

$$12\left(2e\left(8\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3=51+16e\left(12\pi+\frac{1}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{4}{9}(1-2k)^2}{\frac{1}{9}(13+10k)}}\right)=$$

$$51+16e\left(12\pi+\cfrac{1}{1+\cfrac{4}{9\left(\frac{23}{9}+\cfrac{4}{\frac{11}{3}+\cfrac{100}{9\left(\frac{43}{9}+\cfrac{196}{9\left(\frac{53}{9}+\ldots\right)}\right)}}\right)}}\right)$$

$$12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3=$$

$$51+e\left(16+192\,\pi-\frac{64}{9\left(3+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\,\frac{\frac{4}{9}\left(1+(-1)^{1+k}+k\right)^2}{3+2\,k}\right)}\right)=$$

$$51+e\left(16+192\,\pi-\frac{64}{9\left(3+\frac{4}{5+\frac{16}{9\left(7+\frac{100}{9\left(9+\frac{64}{9\,(11+\ldots)}\right)}\right)}}\right)}\right)$$

$$12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3=51+16\,e\left(12\,\pi+\frac{1}{\frac{13}{9}+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\,\frac{\frac{8}{9}\left(1-2\left\lfloor\frac{1+k}{2}\right\rfloor\right)\left\lfloor\frac{1+k}{2}\right\rfloor}{\frac{1}{9}\left(11+2\,(-1)^k\right)(1+2\,k)}}\right)=$$

$$51+16\,e\left(12\,\pi+\frac{1}{\frac{13}{9}+-\frac{8}{9\left(3-\frac{8}{9\left(\frac{65}{9}-\frac{16}{3\left(7-\frac{16}{3\,(13+\ldots)}\right)}\right)}\right)}}\right)$$

$\underset{k=k_1}{\overset{k_2}{\mathrm{K}}}\,a_k\,/\,b_k$ is a continued fraction

$\lfloor x \rfloor$ is the floor function

((12(((2e(8π + tan^(-1)(2/3))+4)))+3))^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3}+{C_{\text{MRB}}}^{1-1/(4\pi)+\pi}$$

$\tan^{-1}(x)$ is the inverse tangent function

C_{MRB} is the MRB constant

Exact Result

$${C_{\text{MRB}}}^{1-1/(4\pi)+\pi}+\sqrt[15]{3+12\left(4+2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)\right)}$$

(result in radians)

Decimal approximation

1.644937360756483714439076375164133994831961882609667231748119204 4

…

(result in radians)

1.64493736075…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$${C_{\text{MRB}}}^{1-1/(4\pi)+\pi}+\sqrt[15]{51+192\,e\,\pi+24\,e\tan^{-1}\left(\frac{2}{3}\right)}$$

$$C_{\text{MRB}}{}^{1-1/(4\pi)+\pi} + \sqrt[15]{51 + 24\,e\left(8\pi + \tan^{-1}\left(\frac{2}{3}\right)\right)}$$

$$C_{\text{MRB}}{}^{1-1/(4\pi)+\pi} + \sqrt[15]{3\left(17 + 64\,e\,\pi + 8\,e\,\tan^{-1}\left(\frac{2}{3}\right)\right)}$$

(1/27(((12(((2e(8π + tan^(-1)(2/3))+4)))+3))-1))^2

Input

$$\left(\frac{1}{27}\left(\left(12\left(2\,e\left(8\pi + \tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2$$

$\tan^{-1}(x)$ is the inverse tangent function

Exact Result

$$\frac{1}{729}\left(2 + 12\left(4 + 2\,e\left(8\pi + \tan^{-1}\left(\frac{2}{3}\right)\right)\right)\right)^2$$

(result in radians)

Decimal approximation

4095.950382461440569318824973851625268689897489855679595355705382 77

…

(result in radians)

4095.95038246144…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192).

This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Expanded form

$$\frac{2500}{729}+\frac{6400\,e\,\pi}{243}+\frac{4096\,e^2\,\pi^2}{81}+\frac{800}{243}\,e\tan^{-1}\left(\frac{2}{3}\right)+\frac{1024}{81}\,e^2\,\pi\tan^{-1}\left(\frac{2}{3}\right)+\frac{64}{81}\,e^2\tan^{-1}\left(\frac{2}{3}\right)^2$$

Alternate forms

$$\frac{4}{729}\left(25+96\,e\,\pi+12\,e\tan^{-1}\left(\frac{2}{3}\right)\right)^2$$

$$\frac{4}{729}\left(25+12\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)\right)^2$$

$$\frac{4}{729}\,(25+96\,e\,\pi)^2+\frac{32}{243}\,e\,(25+96\,e\,\pi)\tan^{-1}\left(\frac{2}{3}\right)+\frac{64}{81}\,e^2\tan^{-1}\left(\frac{2}{3}\right)^2$$

Alternative representations

$$\left(\frac{1}{27}\left(\left(12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2 = \left(\frac{1}{27}\left(2+12\left(4+2\,e\left(8\,\pi+\mathrm{sc}^{-1}\left(\frac{2}{3}\,\middle|\,0\right)\right)\right)\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2 = \left(\frac{1}{27}\left(2+12\left(4+2\,e\left(8\,\pi+\tan^{-1}\left(1,\,\frac{2}{3}\right)\right)\right)\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2 = \left(\frac{1}{27}\left(2+12\left(4+2\,e\left(8\,\pi+\cot^{-1}\left(\frac{1}{\frac{2}{3}}\right)\right)\right)\right)\right)^2$$

$\mathrm{sc}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function sc

$\tan^{-1}(x, y)$ is the inverse tangent function

$\cot^{-1}(x)$ is the inverse cotangent function

Series representations

$$\left(\frac{1}{27}\left(\left(12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2 = \frac{4}{729}\left(25+96\,e\,\pi+12\,e\sum_{k=0}^{\infty}\frac{\left(\frac{3}{2}\right)^{-1-2k}e^{i\,k\,\pi}}{1+2\,k}\right)^2$$

$$\left(\frac{1}{27}\left(\left(12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2 = \frac{4}{729}\left(25+e\left(96\,\pi-6\,i\log\left(1+\frac{2\,i}{3}\right)+6\,i\log(2)\right)-6\,i\,e\sum_{k=1}^{\infty}\frac{\left(\frac{1}{2}+\frac{i}{3}\right)^k}{k}\right)^2$$

$$\left(\frac{1}{27}\left(\left(12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2 =$$
$$\frac{4}{729}\left(25+e\left(96\,\pi+6\,i\log\left(1-\frac{2\,i}{3}\right)-6\,i\log(2)\right)+6\,i\,e\sum_{k=1}^{\infty}\frac{\left(\frac{1}{2}-\frac{i}{3}\right)^k}{k}\right)^2$$

$\log(x)$ is the natural logarithm

Integral representations

$$\left(\frac{1}{27}\left(\left(12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2 =$$
$$\frac{4}{729}\left(25+96\,e\,\pi+72\,e\int_0^1\frac{1}{9+4\,t^2}\,dt\right)^2$$

$$\left(\frac{1}{27}\left(\left(12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2 =$$
$$\frac{4\left(\pi^{3/2}\,(25+96\,e\,\pi)-2\,i\,e\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(\frac{9}{13}\right)^s\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)^2\,ds\right)^2}{729\,\pi^3}\quad\text{for}\quad 0<\gamma<\frac{1}{2}$$

$$\left(\frac{1}{27}\left(\left(12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2 =$$
$$\frac{4\left(\pi\,(25+96\,e\,\pi)-2\,i\,e\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\left(\frac{9}{4}\right)^s\Gamma\left(\frac{1}{2}-s\right)\Gamma(1-s)\,\Gamma(s)}{\Gamma\left(\frac{3}{2}-s\right)}\,ds\right)^2}{729\,\pi^2}\quad\text{for}\ 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representations

$$\left(\frac{1}{27}\left(\left(12\left(2e\left(8\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2 =$$

$$\frac{1}{729}\left(50+16e\left(12\pi+\frac{1}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{4k^2}{9}}{1+2k}}\right)\right)^2 =$$

$$\frac{1}{729}\left(50+16e\left(12\pi+\frac{1}{1+\cfrac{4}{9\left(3+\cfrac{16}{9\left(5+\cfrac{4}{7+\cfrac{64}{9\,(9+\ldots)}}\right)}\right)}}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2 =$$

$$\frac{1}{729}\left(50+16\,e\left(12\,\pi+\frac{1}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{4}{9}(1-2k)^2}{\frac{1}{9}(13+10k)}}\right)\right)^2 =$$

$$\frac{1}{729}\left(50+16\,e\left(12\,\pi+\frac{1}{1+\dfrac{4}{9\left(\dfrac{23}{9}+\dfrac{4}{\frac{11}{3}+\dfrac{100}{9\left(\frac{43}{9}+\frac{196}{9\left(\frac{53}{9}+\ldots\right)}\right)}}\right)}}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2 =$$

$$\frac{1}{729}\left(50+e\left(16+192\,\pi-\frac{64}{9\left(3+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{4}{9}\left(1+(-1)^{1+k}+k\right)^2}{3+2k}\right)}\right)\right)^2 =$$

$$\frac{1}{729}\left(50+e\left(16+192\,\pi-\frac{64}{9\left(3+\dfrac{4}{5+\dfrac{16}{9\left(7+\dfrac{100}{9\left(9+\frac{64}{9\,(11+\ldots)}\right)}\right)}}\right)}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(12\left(2\,e\left(8\,\pi+\tan^{-1}\left(\frac{2}{3}\right)\right)+4\right)+3\right)-1\right)\right)^2 =$$

$$\frac{1}{729}\left(50+16\,e\left(12\,\pi+\frac{1}{\frac{13}{9}+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{\frac{8}{9}\left(1-2\left\lfloor\frac{1+k}{2}\right\rfloor\right)\left\lfloor\frac{1+k}{2}\right\rfloor}{\frac{1}{9}\left(11+2\,(-1)^k\right)(1+2\,k)}}\right)\right)^2 =$$

$$\frac{1}{729}\left(50+16\,e\left(12\,\pi+\frac{1}{\frac{13}{9}+-\frac{8}{9\left(3-\frac{8}{9\left(\frac{65}{9}-\frac{16}{3\left(7-\frac{16}{3\,(13+\ldots)}\right)}\right)}\right)}}\right)\right)^2$$

$\underset{k=k_1}{\overset{k_2}{\mathrm{K}}}\, a_k \,/\, b_k$ is a continued fraction

$\lfloor x \rfloor$ is the floor function

We analyze the following equation:

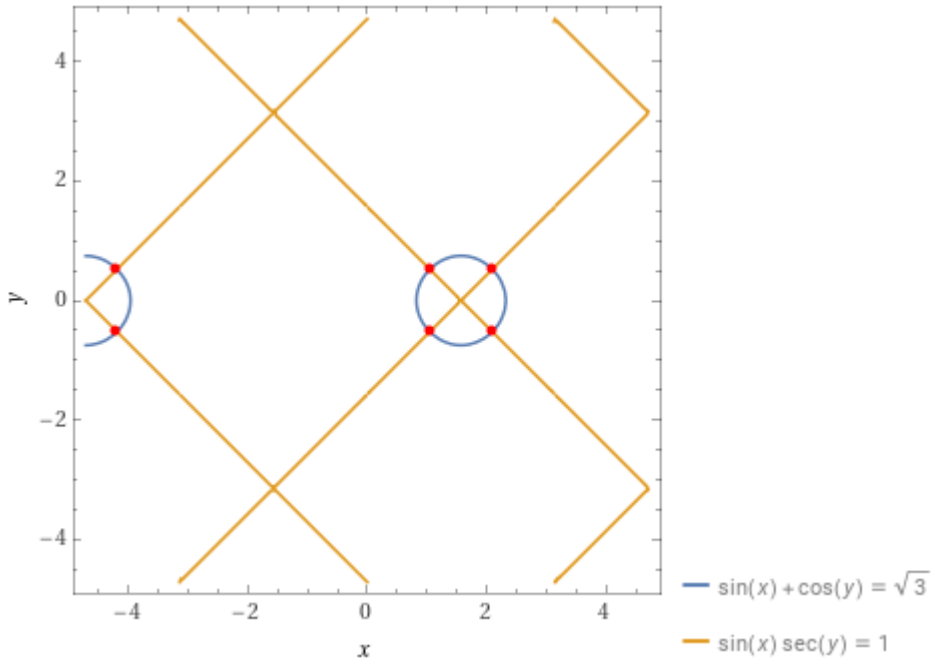
$$\begin{cases} \operatorname{sen} x + \cos y = \sqrt{3} \\ \dfrac{\operatorname{sen} x}{\cos y} = 1. \end{cases}$$

sin x + cos y=√3, sin x/cos y=1

Input

$$\left\{\sin(x) + \cos(y) = \sqrt{3}\,,\ \frac{\sin(x)}{\cos(y)} = 1\right\}$$

Plot of solution set



sec(x) is the secant function

Alternate form assuming x and y are real

$$\left\{\sin(x) + \cos(y) = \sqrt{3}\,,\ \frac{2\sin(x)\cos(y)}{\cos(2y) + 1} = 1\right\}$$

Alternate forms

$$\left\{2\sin\left(\frac{x}{2}-\frac{y}{2}+\frac{\pi}{4}\right)\sin\left(\frac{x}{2}+\frac{y}{2}+\frac{\pi}{4}\right)=\sqrt{3}\,,\ \sin(x)\sec(y)=1\right\}$$

$$\left\{\sin(x)+\cos(y)=\sqrt{3}\,,\ \sin\left(\frac{x}{2}-\frac{y}{2}\right)=\cos\left(\frac{x}{2}-\frac{y}{2}\right)\vee\sin\left(\frac{x}{2}+\frac{y}{2}\right)=\cos\left(\frac{x}{2}+\frac{y}{2}\right)\right\}$$

$$\left\{\frac{1}{2}\,i\,e^{-i\,x}-\frac{1}{2}\,i\,e^{i\,x}+\frac{e^{-i\,y}}{2}+\frac{e^{i\,y}}{2}=\sqrt{3}\,,\ \frac{i\left(e^{-i\,x}-e^{i\,x}\right)}{e^{-i\,y}+e^{i\,y}}=1\right\}$$

$e_1 \vee e_2 \vee \ldots$ is the logical OR function

Solutions

$$x \approx 0.666667\,(9.42478\,n_1+3.14159)\,,$$
$$y \approx 6.28319\,n_2-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\,n_1+3.14159)))\,,$$
$$n_1 \in \mathbb{Z}\,,\quad n_2 \in \mathbb{Z}$$

$$x \approx 0.666667\,(9.42478\,n_1+3.14159)\,,$$
$$y \approx \cos^{-1}(1.73205-\sin(0.666667\,(9.42478\,n_1+3.14159)))+6.28319\,n_2\,,$$
$$n_1 \in \mathbb{Z}\,,\quad n_2 \in \mathbb{Z}$$

$$x \approx 0.333333\,(18.8496\,n_1+3.14159)\,,$$
$$y \approx 6.28319\,n_2-\cos^{-1}(1.73205-\sin(0.333333\,(18.8496\,n_1+3.14159)))\,,$$
$$n_1 \in \mathbb{Z}\,,\quad n_2 \in \mathbb{Z}$$

$$x \approx 0.333333\,(18.8496\,n_1+3.14159)\,,$$
$$y \approx \cos^{-1}(1.73205-\sin(0.333333\,(18.8496\,n_1+3.14159)))+6.28319\,n_2\,,$$
$$n_1 \in \mathbb{Z}\,,\quad n_2 \in \mathbb{Z}$$

$\cos^{-1}(x)$ is the inverse cosine function

$\mathbb{Z}$ is the set of integers

From the solution:

$$x \approx 0.666667\,(9.42478\,n_1 + 3.14159)\,,$$
$$y \approx 6.28319\,n_2 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478\,n_1 + 3.14159)))\,,$$
$$n_1 \in \mathbb{Z}\,,\quad n_2 \in \mathbb{Z}$$

for $n_1 = 2$, $n_2 = 4$:

x≈0.666667 (9.42478*2 + 3.14159)

Input interpretation

$0.666667\,(9.42478 \times 2 + 3.14159)$

Result

14.66077399705

14.66077399705

y≈6.28319*4 - cos^(-1)(1.73205 - sin(0.666667 (9.42478*2 + 3.14159)))

Input interpretation

$6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159)))$

$\cos^{-1}(x)$ is the inverse cosine function

Result

24.609167889659429383651806984636149989847973492610060123348715741
…

(result in radians)

24.60916788….

Alternative representations

$$6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159))) = 25.1328 - \mathrm{cd}^{-1}(1.73205 - \sin(14.6608)\,|\,0)$$

$$6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159))) = 25.1328 - \mathrm{cn}^{-1}(1.73205 - \sin(14.6608)\,|\,0)$$

$$6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159))) = 25.1328 - \cos^{-1}\left(1.73205 + \cos\left(14.6608 + \frac{\pi}{2}\right)\right)$$

$\mathrm{cd}^{-1}(x\,|\,m)$ is the inverse of the Jacobi elliptic function cd

$\mathrm{cn}^{-1}(x\,|\,m)$ is the inverse of the Jacobi elliptic function cn

Series representations

$$6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159))) = 25.1328 - \frac{\pi}{2} + \sum_{k=0}^{\infty} \frac{\left(\frac{1}{2}\right)_k (1.73205 - \sin(14.6608))^{1+2k}}{(1+2k)\,k!}$$

$$6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159))) = 25.1328 - \pi + \sqrt{2}\,\sqrt{2.73205 - \sin(14.6608)} \sum_{k=0}^{\infty} \frac{\left(\frac{1}{2}\right)_k (1.36603 - 0.5\sin(14.6608))^k}{(1+2k)\,k!}$$

$$6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159))) = 25.1328 - \frac{1}{2}\pi \exp\left(i\pi \left\lfloor \frac{\arg(-1.73205 + x + \sin(14.6608))}{2\pi} \right\rfloor\right) + \frac{1}{2} \exp\left(i\pi \left\lfloor \frac{\arg(-1.73205 + x + \sin(14.6608))}{2\pi} \right\rfloor\right) \sqrt{\pi} \sum_{k=0}^{\infty} \frac{2^k\, x^{1-k}\, {}_3\tilde{F}_2\left(\frac{1}{2}, \frac{1}{2}, 1; 1 - \frac{k}{2}, \frac{3-k}{2}; x^2\right) (1.73205 - x - \sin(14.6608))^k}{k!}$$

for $(x \in \mathbb{R}$ and $x > 1)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

${}_p\tilde{F}_q(a_1, \ldots, a_p; b_1, \ldots, b_q; z)$ is the regularized generalized hypergeometric function

i is the imaginary unit

$\mathbb{R}$ is the set of real numbers

Integral representations

$$6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159))) = 25.1328 - \int_{1.73205 - \sin(14.6608)}^{1} \frac{1}{\sqrt{1 - t^2}}\, dt$$

$$6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159))) = 25.1328 - 0.5\,\pi + \frac{0.433013 - 0.25\sin(14.6608)}{i\,\pi\,\sqrt{\pi}} \int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} \Gamma\left(\frac{1}{2} - s\right)^2 \Gamma(s)\, \Gamma\left(\frac{1}{2} + s\right) \left(1 - (-1.73205 + \sin(14.6608))^2\right)^{-s}\, ds \quad \text{for } 0 < \gamma < \frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representation

$$6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159))) = 25.1328 - \frac{\pi}{2} - \frac{(-1.73205 + \sin(14.6608))\sqrt{1 - (-1.73205 + \sin(14.6608))^2}}{1 + \underset{k=1}{\overset{\infty}{\mathrm{K}}} \frac{-4\left\lfloor \frac{1+k}{2} \right\rfloor \left(-0.5 + \left\lfloor \frac{1+k}{2} \right\rfloor\right) (-1.73205 + \sin(14.6608))^2}{1+2k}} = 23.562 + \cfrac{0.433009}{1 + -\cfrac{1.50001}{3 - \cfrac{1.50001}{5 - \cfrac{9.00007}{7 - \cfrac{9.00007}{9 + \ldots}}}}}$$

$\underset{k=k_1}{\overset{k_2}{\mathrm{K}}}\, a_k / b_k$ is a continued fraction

Multiple-argument formulas

$$6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159))) =$$
$$25.1328 - \cos^{-1}\left(1.73205 - 3\sin(4.88692) + 4\sin^3(4.88692)\right)$$

$$6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159))) =$$
$$25.1328 - \cos^{-1}(1.73205 - 2\cos(7.33039)\sin(7.33039))$$

$$6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159))) =$$
$$25.1328 - \cos^{-1}\left(1.73205 - 3\cos^2(4.88692)\sin(4.88692) + \sin^3(4.88692)\right)$$

From the sum of the two results:

(0.666667 (9.42478*2 + 3.14159))+((6.28319*4 - cos^(-1)(1.73205 - sin(0.666667 (9.42478*2 + 3.14159)))))

Input interpretation

$$0.666667\,(9.42478 \times 2 + 3.14159) +$$
$$\left(6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159)))\right)$$

$\cos^{-1}(x)$ is the inverse cosine function

Result

39.2699…

(result in radians)

39.2699….

Alternative representations

$$0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)=39.7935-\mathrm{cd}^{-1}(1.73205-\sin(14.6608)\,|\,0)$$

$$0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)=39.7935-\mathrm{cn}^{-1}(1.73205-\sin(14.6608)\,|\,0)$$

$$0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)=39.7935-\cos^{-1}\left(1.73205+\cos\left(14.6608+\frac{\pi}{2}\right)\right)$$

$\mathrm{cd}^{-1}(x\,|\,m)$ is the inverse of the Jacobi elliptic function cd

$\mathrm{cn}^{-1}(x\,|\,m)$ is the inverse of the Jacobi elliptic function cn

Series representations

$$0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)=39.7935-\frac{\pi}{2}+\sum_{k=0}^{\infty}\frac{\left(\frac{1}{2}\right)_k\,(1.73205-\sin(14.6608))^{1+2k}}{(1+2k)\,k!}$$

$$0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)=39.7935-\pi+\sqrt{2}\,\sqrt{2.73205-\sin(14.6608)}\sum_{k=0}^{\infty}\frac{\left(\frac{1}{2}\right)_k\,(1.36603-0.5\sin(14.6608))^{k}}{(1+2k)\,k!}$$

$$0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)=$$
$$39.7935-\frac{1}{2}\,\pi\exp\left(i\,\pi\left\lfloor\frac{\arg(-1.73205+x+\sin(14.6608))}{2\,\pi}\right\rfloor\right)+$$
$$\frac{1}{2}\exp\left(i\,\pi\left\lfloor\frac{\arg(-1.73205+x+\sin(14.6608))}{2\,\pi}\right\rfloor\right)\sqrt{\pi}$$
$$\sum_{k=0}^{\infty}\frac{2^k\,x^{1-k}\,{}_3\tilde{F}_2\left(\frac{1}{2},\,\frac{1}{2},\,1;\,1-\frac{k}{2},\,\frac{3-k}{2};\,x^2\right)(1.73205-x-\sin(14.6608))^k}{k!}$$
$$\text{for } (x\in\mathbb{R}\text{ and }x>1)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

${}_p\tilde{F}_q(a_1,\ldots,a_p;b_1,\ldots,b_q;z)$ is the regularized generalized hypergeometric function

i is the imaginary unit

$\mathbb{R}$ is the set of real numbers

Integral representations

$$0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)=$$
$$39.7935-\int_{1.73205-\sin(14.6608)}^{1}\frac{1}{\sqrt{1-t^2}}\,dt$$

$$0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)=$$
$$39.7935-0.5\,\pi+\frac{0.433013-0.25\sin(14.6608)}{i\,\pi\sqrt{\pi}}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)$$
$$\Gamma\left(\frac{1}{2}+s\right)\left(1-(-1.73205+\sin(14.6608))^2\right)^{-s}\,ds\quad\text{for } 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representation

$$0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)=$$

$$39.7935-\frac{\pi}{2}-\frac{(-1.73205+\sin(14.6608))\sqrt{1-(-1.73205+\sin(14.6608))^2}}{1+\underset{k=1}{\overset{\infty}{\mathrm{K}}}\frac{-4\left\lfloor\frac{1+k}{2}\right\rfloor\left(-0.5+\left\lfloor\frac{1+k}{2}\right\rfloor\right)(-1.73205+\sin(14.6608))^2}{1+2k}}=$$

$$38.2227+\cfrac{0.433009}{1+-\cfrac{1.50001}{3-\cfrac{1.50001}{5-\cfrac{9.00007}{7-\cfrac{9.00007}{9+\ldots}}}}}$$

$\underset{k=k_1}{\overset{k_2}{\mathrm{K}}}\,a_k\,/\,b_k$ is a continued fraction

Multiple-argument formulas

$$0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)=$$
$$39.7935-\cos^{-1}\left(1.73205-3\sin(4.88692)+4\sin^3(4.88692)\right)$$

$$0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)=$$
$$39.7935-\cos^{-1}(1.73205-2\cos(7.33039)\sin(7.33039))$$

$$0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)=$$
$$39.7935-\cos^{-1}\left(1.73205-3\cos^2(4.88692)\sin(4.88692)+\sin^3(4.88692)\right)$$

From which:

(21*5)(((0.666667 (9.42478*2 + 3.14159))+((6.28319*4 - cos^(-1)(1.73205 - sin(0.666667 (9.42478*2 + 3.14159)))))))-29+2-1/Pi

Input interpretation

$$(21 \times 5)\left(0.666667\,(9.42478 \times 2 + 3.14159) + \left(6.28319 \times 4 - \cos^{-1}(1.73205 - \sin(0.666667\,(9.42478 \times 2 + 3.14159)))\right)\right) - 29 + 2 - \frac{1}{\pi}$$

$\cos^{-1}(x)$ is the inverse cosine function

Result

4096.03…

(result in radians)

4096.03…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero.

Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternative representations

$$\begin{aligned}&(0.666667\,(9.42478\times 2+3.14159)+\\&\qquad(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))))\\&21\times 5-29+2-\frac{1}{\pi}=-27+\\&105\left(39.7935-\mathrm{cd}^{-1}(1.73205-\sin(14.6608)\mid 0)\right)-\frac{1}{\pi}\end{aligned}$$

$$\begin{aligned}&(0.666667\,(9.42478\times 2+3.14159)+\\&\qquad(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))))\\&21\times 5-29+2-\frac{1}{\pi}=-27+\\&105\left(39.7935-\mathrm{cn}^{-1}(1.73205-\sin(14.6608)\mid 0)\right)-\frac{1}{\pi}\end{aligned}$$

$$\begin{aligned}&(0.666667\,(9.42478\times 2+3.14159)+\\&\qquad(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))))\\&21\times 5-29+2-\frac{1}{\pi}=-27+\\&105\left(39.7935-\cos^{-1}\left(1.73205+\cos\left(14.6608+\frac{\pi}{2}\right)\right)\right)-\frac{1}{\pi}\end{aligned}$$

$\mathrm{cd}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function cd

$\mathrm{cn}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function cn

Series representations

$$\left(0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)$$
$$21\times 5-29+2-\frac{1}{\pi}=4151.32-\frac{1}{\pi}-52.5\,\pi+$$
$$105\sum_{k=0}^{\infty}\frac{\left(\frac{1}{2}\right)_k\,(1.73205-\sin(14.6608))^{1+2k}}{(1+2k)\,k!}$$

$$\left(0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)$$
$$21\times 5-29+2-\frac{1}{\pi}=4151.32-\frac{1}{\pi}-105\,\pi+$$
$$105\sqrt{2}\,\sqrt{2.73205-\sin(14.6608)}\sum_{k=0}^{\infty}\frac{\left(\frac{1}{2}\right)_k\,(1.36603-0.5\sin(14.6608))^{k}}{(1+2k)\,k!}$$

$$\left(0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)21\times 5-29+2-\frac{1}{\pi}=$$
$$4151.32-\frac{1}{\pi}-52.5\,\pi\exp\left(i\,\pi\left\lfloor\frac{\arg(-1.73205+x+\sin(14.6608))}{2\,\pi}\right\rfloor\right)+$$
$$52.5\exp\left(i\,\pi\left\lfloor\frac{\arg(-1.73205+x+\sin(14.6608))}{2\,\pi}\right\rfloor\right)\sqrt{\pi}$$
$$\sum_{k=0}^{\infty}\frac{2^k\,x^{1-k}\,{}_3\tilde{F}_2\left(\frac{1}{2},\,\frac{1}{2},\,1;\,1-\frac{k}{2},\,\frac{3-k}{2};\,x^2\right)(1.73205-x-\sin(14.6608))^{k}}{k!}$$
for $(x\in\mathbb{R}$ and $x>1)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

${}_p\tilde{F}_q(a_1,\ldots,a_p;b_1,\ldots,b_q;z)$ is the regularized generalized hypergeometric function

i is the imaginary unit

$\mathbb{R}$ is the set of real numbers

Integral representations

$$\begin{aligned}&\Big(0.666667\,(9.42478\times 2+3.14159)+\\&\qquad\Big(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\Big)\Big)\\&21\times 5-29+2-\frac{1}{\pi}=4151.32-\frac{1}{\pi}-105\int_{1.73205-\sin(14.6608)}^{1}\frac{1}{\sqrt{1-t^2}}\,dt\end{aligned}$$

$$\begin{aligned}&\Big(0.666667\,(9.42478\times 2+3.14159)+\Big(6.28319\times 4-\\&\qquad\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\Big)\Big)\,21\times 5-\\&29+2-\frac{1}{\pi}=\frac{1}{i\,\pi\sqrt{\pi}}\left(45.4663-26.25\sin(14.6608)\right.\\&\qquad\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\Gamma\Big(\frac{1}{2}-s\Big)^2\,\Gamma(s)\,\Gamma\Big(\frac{1}{2}+s\Big)\Big(1-(-1.73205+\sin(14.6608))^2\Big)^{-s}\,ds+\\&\qquad\left.i\left(-1+4151.32\,\pi-52.5\,\pi^2\right)\sqrt{\pi}\right)\quad\text{for } 0<\gamma<\frac{1}{2}\end{aligned}$$

$\Gamma(x)$ is the gamma function

Continued fraction representation

$$\begin{aligned}&\Big(0.666667\,(9.42478\times 2+3.14159)+\\&\qquad\Big(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\Big)\Big)\\&21\times 5-29+2-\frac{1}{\pi}=4151.32-\frac{1}{\pi}-52.5\,\pi-\\&\frac{105\,(-1.73205+\sin(14.6608))\,\sqrt{1-(-1.73205+\sin(14.6608))^2}}{1+\operatorname*{K}_{k=1}^{\infty}\frac{-4\left\lfloor\frac{1+k}{2}\right\rfloor\left(-0.5+\left\lfloor\frac{1+k}{2}\right\rfloor\right)(-1.73205+\sin(14.6608))^2}{1+2\,k}}=\\&3986.07+\cfrac{45.466}{1+-\cfrac{1.50001}{3-\cfrac{1.50001}{5-\cfrac{9.00007}{7-\cfrac{9.00007}{9+\dots}}}}}\end{aligned}$$

$\operatorname*{K}_{k=k_1}^{k_2} a_k / b_k$ is a continued fraction

Multiple-argument formulas

$$\begin{aligned}&\big(0.666667\,(9.42478\times 2+3.14159)+\\&\qquad\big(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\big)\big)\\&21\times 5-29+2-\frac{1}{\pi}=4151.32-\frac{1}{\pi}-\\&105\cos^{-1}\big(1.73205-3\sin(4.88692)+4\sin^3(4.88692)\big)\end{aligned}$$

$$\begin{aligned}&\big(0.666667\,(9.42478\times 2+3.14159)+\\&\qquad\big(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\big)\big)\\&21\times 5-29+2-\frac{1}{\pi}=4151.32-\frac{1}{\pi}-\\&105\cos^{-1}(1.73205-2\cos(7.33039)\sin(7.33039))\end{aligned}$$

$$\begin{aligned}&\big(0.666667\,(9.42478\times 2+3.14159)+\\&\qquad\big(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\big)\big)\\&21\times 5-29+2-\frac{1}{\pi}=4151.32-\frac{1}{\pi}-\\&105\cos^{-1}\big(1.73205-3\cos^2(4.88692)\sin(4.88692)+\sin^3(4.88692)\big)\end{aligned}$$

27*sqrt((21*5)(((0.666667 (9.42478*2 + 3.14159))+((6.28319*4 - cos^(-1)(1.73205 - sin(0.666667 (9.42478*2 + 3.14159)))))))-29+2-1/Pi)+1

Input interpretation

$$27\sqrt{\Big((21\times 5)\big(0.666667\,(9.42478\times 2+3.14159)+\big(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\big)\big)-29+2-\frac{1}{\pi}\Big)}+1$$

$\cos^{-1}(x)$ is the inverse cosine function

Result

1729.01…

(result in radians)

1729.01….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry.

Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternative representations

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)21\times 5-29+2-\frac{1}{\pi}\right)}+1=1+\frac{1}{27\sqrt{-27+105\left(39.7935-\mathrm{cd}^{-1}(1.73205-\sin(14.6608)\mid 0)\right)-\frac{1}{\pi}}}$$

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)21\times 5-29+2-\frac{1}{\pi}\right)}+1=1+\frac{1}{27\sqrt{-27+105\left(39.7935-\mathrm{cn}^{-1}(1.73205-\sin(14.6608)\mid 0)\right)-\frac{1}{\pi}}}$$

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)21\times 5-29+2-\frac{1}{\pi}\right)}+1=1+\frac{1}{27\sqrt{-27+105\left(39.7935-\cos^{-1}\left(1.73205+\cos\left(14.6608+\frac{\pi}{2}\right)\right)\right)-\frac{1}{\pi}}}$$

$\mathrm{cd}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function cd

$\mathrm{cn}^{-1}(x \mid m)$ is the inverse of the Jacobi elliptic function cn

Series representations

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)21\times 5-29+2-\frac{1}{\pi}\right)}+1=1+27\exp\left(i\,\pi\left\lfloor\frac{\arg\left(4151.32-\frac{1}{\pi}-x-105\cos^{-1}(1.73205-\sin(14.6608))\right)}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\,x^{-k}\left(4151.32-\frac{1}{\pi}-x-105\cos^{-1}(1.73205-\sin(14.6608))\right)^k\left(-\frac{1}{2}\right)_k}{k!}$$

for $(x\in\mathbb{R}$ and $x<0)$

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)21\times 5-29+2-\frac{1}{\pi}\right)}+1=1+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(4151.32-\frac{1}{\pi}-105\cos^{-1}(1.73205-\sin(14.6608))-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2\left(1+\left\lfloor\arg\left(4151.32-\frac{1}{\pi}-105\cos^{-1}(1.73205-\sin(14.6608))-z_0\right)/(2\pi)\right\rfloor\right)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(4151.32-\frac{1}{\pi}-105\cos^{-1}(1.73205-\sin(14.6608))-z_0\right)^k z_0^{-k}}{k!}$$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

i is the imaginary unit

$\mathbb{R}$ is the set of real numbers

Integral representations

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)}\;21\times 5-29+2-\frac{1}{\pi}\Bigg)+1=1+\sqrt{27\left(4151.32-\frac{1}{\pi}-105\int_{1.73205-\sin(14.6608)}^{1}\frac{1}{\sqrt{1-t^2}}\,dt\right)}$$

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)}\;21\times 5-29+2-\frac{1}{\pi}\Bigg)+1=1+\sqrt{27\left(\frac{1}{i\,\pi\sqrt{\pi}}\left(45.4663-26.25\sin(14.6608)\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)\left(1-(-1.73205+\sin(14.6608))^2\right)^{-s}\,ds+i\left(-1+4151.32\,\pi-52.5\,\pi^2\right)\sqrt{\pi}\right)\right)}\quad\text{for } 0<\gamma<\frac{1}{2}$$

$\Gamma(x)$ is the gamma function

Continued fraction representations

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)}\;21\times 5-29+2-\frac{1}{\pi}\Bigg)+1=4\left(7+27\left(\underset{k=1}{\overset{\infty}{\mathrm{K}}}\,\frac{259.395-\frac{0.0625}{\pi}-6.5625\cos^{-1}(1.73205-\sin(14.6608))}{\frac{1}{2}}\right)\right)=4\left(7+27\,\frac{255.939}{\frac{1}{2}+\frac{255.939}{\frac{1}{2}+\frac{255.939}{\frac{1}{2}+\ldots}}}\right)$$

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)}\left(21\times 5-29+2-\frac{1}{\pi}\right)+1=28+27\left(\operatorname*{K}_{k=1}^{\infty}\frac{\frac{52.5\left(0.00952381-39.5269\,\pi+\pi\cos^{-1}(1.73205-\sin(14.6608))\right)\left((-1)^k-2\left\lfloor\frac{k}{2}\right\rfloor\right)}{\pi}}{1+(-1)^k-\frac{1}{2}\left(-1+(-1)^k\right)k}\right)=28+\cfrac{27}{\cfrac{2047.51}{1+\cfrac{2047.51}{2+\cfrac{6142.54}{3+\cfrac{6142.54}{2+\ldots}}}}}$$

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)}\left(21\times 5-29+2-\frac{1}{\pi}\right)+1=112\,087.-\frac{27.}{\pi}-2835\cos^{-1}(1.73205-\sin(14.6608))+27.\left(\operatorname*{K}_{k=1}^{\infty}\left(\left(-1.72293\times 10^7-\frac{1}{\pi^2}+\frac{8301.64}{\pi}+\left(871\,672.-\frac{210.}{\pi}\right)\cos^{-1}(1.73205-\sin(14.6608))-11\,025\cos^{-1}(1.73205-\sin(14.6608))^2\right)\Big/\left(8302.64-\frac{2}{\pi}-210\cos^{-1}(1.73205-\sin(14.6608))\right)\right)\right)=110\,594.+27.\left(-\cfrac{1.67733\times 10^7}{8192.05-\cfrac{1.67733\times 10^7}{8192.05-\cfrac{1.67733\times 10^7}{8192.05-\cfrac{1.67733\times 10^7}{8192.05+\ldots}}}}\right)$$

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)}$$

$$21\times 5-29+2-\frac{1}{\pi}\Bigg)+1=1+27\sqrt{\left(4151.32-\frac{1}{\pi}-52.5\,\pi-\frac{105\,(-1.73205+\sin(14.6608))\sqrt{1-(-1.73205+\sin(14.6608))^2}}{1+\operatorname*{K}_{k=1}^{\infty}\frac{-4\left\lfloor\frac{1+k}{2}\right\rfloor\left(-0.5+\left\lfloor\frac{1+k}{2}\right\rfloor\right)(-1.73205+\sin(14.6608))^2}{1+2k}}\right)}=$$

$$1+27\sqrt{3986.07+\cfrac{45.466}{1+-\cfrac{1.50001}{3-\cfrac{1.50001}{5-\cfrac{9.00007}{7-\cfrac{9.00007}{9+\ldots}}}}}}$$

$\operatorname*{K}_{k=k_1}^{k_2} a_k / b_k$ is a continued fraction

Multiple-argument formulas

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)}$$

$$21\times 5-29+2-\frac{1}{\pi}\Bigg)+1=1+27\sqrt{4151.32-\frac{1}{\pi}-105\cos^{-1}\left(1.73205-3\sin(4.88692)+4\sin^3(4.88692)\right)}$$

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)}$$

$$21\times 5-29+2-\frac{1}{\pi}\Bigg)+1=1+27\sqrt{4151.32-\frac{1}{\pi}-105\cos^{-1}(1.73205-2\cos(7.33039)\sin(7.33039))}$$

$$27\sqrt{\left((0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)}$$
$$21\times 5-29+2-\frac{1}{\pi}\Big)+1=1+27\sqrt{\left(4151.32-\frac{1}{\pi}-105\cos^{-1}\left(1.73205-3\cos^2(4.88692)\sin(4.88692)+\sin^3(4.88692)\right)\right)}$$

(27*sqrt((21*5)(((0.666667 (9.42478*2 + 3.14159))+((6.28319*4 - cos^(-1)(1.73205 - sin(0.666667 (9.42478*2 + 3.14159)))))))-29+2-1/Pi)+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\left(27\sqrt{\left((21\times 5)\left(0.666667\,(9.42478\times 2+3.14159)+\left(6.28319\times 4-\cos^{-1}(1.73205-\sin(0.666667\,(9.42478\times 2+3.14159)))\right)\right)-29+2-\frac{1}{\pi}\right)+1}\right)\,\hat{}\,(1/15)+{C_{\text{MRB}}}^{1-1/(4\pi)+\pi}$$

$\cos^{-1}(x)$ is the inverse cosine function

C_{MRB} is the MRB constant

Result

1.64493836623514714809909737273022001927145150975174899002526297 32…

(result in radians)

1.64493836623…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

We analyze the following equation:

$$\pm \sqrt{3}\,\text{sen}\,y\,\sqrt{1-\text{sen}^2 y} = \pm 3\,\text{sen}\,y\,\sqrt{1-3\,\text{sen}^2 y}.$$

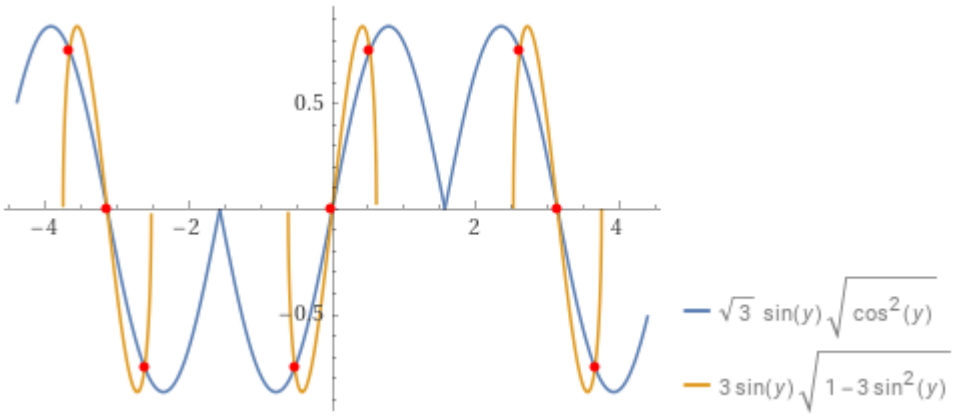
We consider:

√3 sin y √(1 – sin^2 y) = 3 sin y √(1 – 3 sin^2 y)

Input

$$\sqrt{3}\,\sin(y)\,\sqrt{1-\sin^2(y)} = 3\sin(y)\,\sqrt{1-3\sin^2(y)}$$

Plot **(figures that can be related to the open strings)**



Alternate form assuming y is real

$$\sqrt{3}\,\sin(y)\,|\cos(y)| = 3\sin(y)\,\sqrt{1-3\sin^2(y)}$$

| z | is the absolute value of z

Alternate forms

$$\sqrt{3}\,\sin(y)\,\sqrt{\cos^2(y)} = 3\sin(y)\,\sqrt{1-3\sin^2(y)}$$

$$\sqrt{\frac{3}{2}}\ \sin(y)\sqrt{\cos(2y)+1}\ =\frac{3\sin(y)\sqrt{3\cos(2y)-1}}{\sqrt{2}}$$

$$\frac{1}{2}i\sqrt{3}\left(e^{-iy}-e^{iy}\right)\sqrt{1+\frac{1}{4}\left(e^{-iy}-e^{iy}\right)^2}\ =$$
$$\frac{3}{2}i\left(e^{-iy}-e^{iy}\right)\sqrt{1+\frac{3}{4}\left(e^{-iy}-e^{iy}\right)^2}$$

Reduced trigonometric form

$$\sqrt{6+6\cos(2y)}\ \sin(y)=3\sin(y)\sqrt{-2+6\cos(2y)}$$

Solutions

$$y=\pi n,\quad n\in\mathbb{Z}$$

$$y=\pi n-\frac{5\pi}{6},\quad n\in\mathbb{Z}$$

$$y=\pi n-\frac{\pi}{6},\quad n\in\mathbb{Z}$$

$\mathbb{Z}$ is the set of integers

Integer solution

$$y=0$$

From the alternate form

$$\frac{1}{2} i \sqrt{3} \left(e^{-i y} - e^{i y}\right) \sqrt{1 + \frac{1}{4} \left(e^{-i y} - e^{i y}\right)^2} =$$
$$\frac{3}{2} i \left(e^{-i y} - e^{i y}\right) \sqrt{1 + \frac{3}{4} \left(e^{-i y} - e^{i y}\right)^2}$$

we obtain:

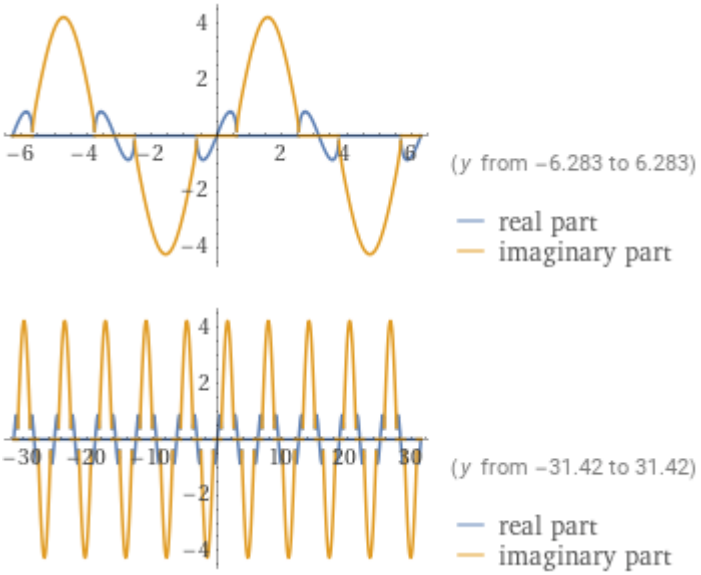
3/2 i (e^(-i y) - e^(i y)) sqrt(1 + 3/4 (e^(-i y) - e^(i y))^2)

Input

$$\frac{3}{2} i \left(e^{-i y} - e^{i y}\right) \sqrt{1 + \frac{3}{4} \left(e^{-i y} - e^{i y}\right)^2}$$

i is the imaginary unit

Plots **(figures that can be related to the open strings)**



Alternate forms

$$\frac{3}{2} \sin(y) \sqrt{6 \cos(2 y) - 2}$$

$$\frac{3}{2}\sqrt{3\,e^{-2\,i\,y}+3\,e^{2\,i\,y}-2}\,\sin(y)$$

$$-\frac{3}{4}\,i\,e^{-i\,y}\left(-1+e^{2\,i\,y}\right)\sqrt{3\,e^{-2\,i\,y}+3\,e^{2\,i\,y}-2}$$

Expanded forms

$$\frac{3}{2}\,i\,e^{-i\,y}\sqrt{1+\frac{3}{4}\left(e^{-i\,y}-e^{i\,y}\right)^2}\;-\frac{3}{2}\,i\,e^{i\,y}\sqrt{1+\frac{3}{4}\left(e^{-i\,y}-e^{i\,y}\right)^2}$$

$$\frac{3}{2}\,i\,e^{-i\,y}\sqrt{\frac{3}{4}\,e^{-2\,i\,y}+\frac{3}{4}\,e^{2\,i\,y}-\frac{1}{2}}\;-\frac{3}{2}\,i\,e^{i\,y}\sqrt{\frac{3}{4}\,e^{-2\,i\,y}+\frac{3}{4}\,e^{2\,i\,y}-\frac{1}{2}}$$

Series expansion at y=0

$$3\,y-5\,y^3-\frac{11\,y^5}{10}+O\left(y^6\right)$$

(Taylor series)

Derivative

$$\frac{d}{dy}\left(\frac{3}{2}\,i\left(e^{-i\,y}-e^{i\,y}\right)\sqrt{1+\frac{3}{4}\left(e^{-i\,y}-e^{i\,y}\right)^2}\right)=\frac{3\,e^{-3\,i\,y}\left(-e^{2\,i\,y}-e^{4\,i\,y}+3\,e^{6\,i\,y}+3\right)}{2\sqrt{3\,e^{-2\,i\,y}+3\,e^{2\,i\,y}-2}}$$

Indefinite integral

$$\int\frac{3}{2}\,i\left(e^{-i\,y}-e^{i\,y}\right)\sqrt{1+\frac{3}{4}\left(e^{-i\,y}-e^{i\,y}\right)^2}\;dy=$$

$$\sqrt{3}\,\log\left(\sqrt{6}\,\cos(y)+\sqrt{3\cos(2\,y)-1}\right)-\frac{3\cos(y)\sqrt{3\cos(2\,y)-1}}{2\sqrt{2}}+\text{constant}$$

(assuming a complex-valued logarithm)

log(x) is the natural logarithm

From the indefinite integral result

$$\int \frac{3}{2} i \left(e^{-i y} - e^{i y}\right) \sqrt{1 + \frac{3}{4}\left(e^{-i y} - e^{i y}\right)^2}\, dy =$$

$$\sqrt{3}\, \log\left(\sqrt{6}\, \cos(y) + \sqrt{3\cos(2y) - 1}\right) - \frac{3\cos(y)\sqrt{3\cos(2y)-1}}{2\sqrt{2}} + \text{constant}$$

(assuming a complex-valued logarithm)

we obtain:

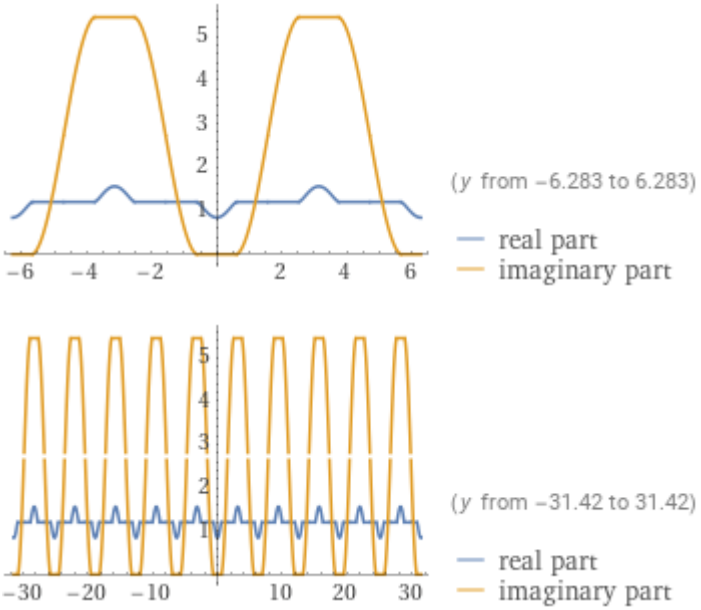
-(3 cos(y) sqrt(-1 + 3 cos(2 y)))/(2 sqrt(2)) + sqrt(3) log(sqrt(6) cos(y) + sqrt(-1 + 3 cos(2 y)))

Input

$$-\frac{3\cos(y)\sqrt{-1 + 3\cos(2y)}}{2\sqrt{2}} + \sqrt{3}\, \log\left(\sqrt{6}\, \cos(y) + \sqrt{-1 + 3\cos(2y)}\right)$$

log(x) is the natural logarithm

Plots **(figures that can be related to the open strings)**



Expanded logarithmic form

$$-\frac{3\cos(y)\sqrt{2(-1+3\cos(2y))}}{2\times 2}+\sqrt{3}\,\log\left(\sqrt{6}\,\cos(y)+\sqrt{-1+3\cos(2y)}\right)$$

Reduced logarithmic form

$$\frac{1}{4}\left(-3\sqrt{2}\,\cos(y)\sqrt{-1+3\cos(2y)}+\log\left(\left(\sqrt{6}\,\cos(y)+\sqrt{-1+3\cos(2y)}\right)^{4\sqrt{3}}\right)\right)$$

Reduced trigonometric form

$$\frac{1}{4}\left(-3\cos(y)\sqrt{-2+6\cos(2y)}+4\sqrt{3}\,\log\left(\sqrt{6}\,\cos(y)+\sqrt{-1+3\cos(2y)}\right)\right)$$

Expanded cosine form

$$-\frac{3}{4}\cos(y)\sqrt{-8+12\cos^2(y)}+\sqrt{3}\,\log\left(\sqrt{6}\,\cos(y)+\sqrt{-4+6\cos^2(y)}\right)$$

Alternate forms

$$-\frac{3\cos(y)\sqrt{3\cos(2y)-1}-2\sqrt{6}\,\log\left(\sqrt{6}\,\cos(y)+\sqrt{3\cos(2y)-1}\right)}{2\sqrt{2}}$$

$$-\frac{3e^{-iy}\sqrt{-1+\frac{3}{2}\left(e^{-2iy}+e^{2iy}\right)}}{4\sqrt{2}}-\frac{3e^{iy}\sqrt{-1+\frac{3}{2}\left(e^{-2iy}+e^{2iy}\right)}}{4\sqrt{2}}+$$

$$\sqrt{3}\,\log\left(\sqrt{\frac{3}{2}}\left(e^{-iy}+e^{iy}\right)+\sqrt{-1+\frac{3}{2}\left(e^{-2iy}+e^{2iy}\right)}\right)$$

Derivative

$$\frac{d}{dy}\left(-\frac{3\cos(y)\sqrt{-1+3\cos(2y)}}{2\sqrt{2}}+\sqrt{3}\,\log\left(\sqrt{6}\,\cos(y)+\sqrt{-1+3\cos(2y)}\right)\right)=$$
$$\frac{1}{4}\left(3\sin(y)\sqrt{6\cos(2y)-2}+\frac{9\sqrt{2}\,\sin(2y)\cos(y)}{\sqrt{-1+3\cos(2y)}}-\right.$$
$$\left.\frac{4\sqrt{3}\left(3\sin(2y)+\sin(y)\sqrt{18\cos(2y)-6}\right)}{\sqrt{18\cos(2y)-6}\,\cos(y)+(-1+3\cos(2y))}\right)$$

From the reduced trigonometric form

$$\frac{1}{4}\left(-3\cos(y)\sqrt{-2+6\cos(2y)}+4\sqrt{3}\,\log\left(\sqrt{6}\,\cos(y)+\sqrt{-1+3\cos(2y)}\right)\right)$$

1/4 (-3 cos(y) sqrt(-2 + 6 cos(2 y)) + 4 sqrt(3) log(sqrt(6) cos(y) + sqrt(-1 + 3 cos(2 y))))

for y = 8:

1/4 (-3 cos(8) sqrt(-2 + 6 cos(2*8)) + 4 sqrt(3) log(sqrt(6) cos(8) + sqrt(-1 + 3 cos(2*8))))

Input

$$\frac{1}{4}\left(-3\cos(8)\sqrt{-2+6\cos(2\times 8)}+4\sqrt{3}\,\log\left(\sqrt{6}\,\cos(8)+\sqrt{-1+3\cos(2\times 8)}\right)\right)$$

$\log(x)$ is the natural logarithm

Exact result

$$\frac{1}{4}\left(4\sqrt{3}\,\log\left(\sqrt{6}\,\cos(8)+i\sqrt{1-3\cos(16)}\right)-3\,i\cos(8)\sqrt{2-6\cos(16)}\right)$$

Decimal approximation

1.200566133852943677145103452038732647773258610222158354126876424…
+
3.334720544734453588340654294116784125736486287370686886417668871…
i

Alternate complex forms

$1.2006 + 3.3347\,i$

$3.5443\,(\cos(1.2252) + i\sin(1.2252))$

$3.5443\,e^{1.2252\,i}$

Expanded form

$$\sqrt{3}\,\log\left(\sqrt{6}\,\cos(8) + i\sqrt{1 - 3\cos(16)}\right) - \frac{3}{4}\,i\cos(8)\sqrt{2 - 6\cos(16)}$$

Alternate forms

$$\frac{1}{4}\left(4\sqrt{3}\,\log\left(\sqrt{6}\,\cos(8) + i\sqrt{1 - 3\cos(16)}\right) - 3\,i\cos(8)\sqrt{2\,(1 - 3\cos(16))}\right)$$

$$\sqrt{3}\,\log(2) + i\left(\sqrt{3}\,\pi - \frac{3}{4}\cos(8)\sqrt{2 - 6\cos(16)} + \sqrt{3}\,\tan^{-1}\left(\sqrt{\frac{1}{6}\,(1 - 3\cos(16))}\,\sec(8)\right)\right)$$

$$\frac{1}{4}\left(4\sqrt{3}\left(\frac{1}{2}\log\left(1+6\cos^2(8)-3\cos(16)\right)+i\left(\pi+\tan^{-1}\left(\sqrt{\frac{1}{6}\left(1-3\cos(16)\right)}\,\sec(8)\right)\right)\right)-3i\cos(8)\sqrt{2-6\cos(16)}\right)$$

sec(x) is the secant function

$\tan^{-1}(x)$ is the inverse tangent function

Alternative representations

$$\frac{1}{4}\left(-3\cos(8)\sqrt{-2+6\cos(2\times 8)}+4\sqrt{3}\,\log\left(\sqrt{6}\,\cos(8)+\sqrt{-1+3\cos(2\times 8)}\right)\right)=\frac{1}{4}\left(4\log\left(\cosh(-8i)\sqrt{6}+\sqrt{-1+3\cosh(-16i)}\right)\sqrt{3}-3\cosh(-8i)\sqrt{-2+6\cosh(-16i)}\right)$$

$$\frac{1}{4}\left(-3\cos(8)\sqrt{-2+6\cos(2\times 8)}+4\sqrt{3}\,\log\left(\sqrt{6}\,\cos(8)+\sqrt{-1+3\cos(2\times 8)}\right)\right)=\frac{1}{4}\left(4\log_e\left(\cos(8)\sqrt{6}+\sqrt{-1+3\cos(16)}\right)\sqrt{3}-3\cosh(8i)\sqrt{-2+6\cosh(16i)}\right)$$

$$\frac{1}{4}\left(-3\cos(8)\sqrt{-2+6\cos(2\times 8)}+4\sqrt{3}\,\log\left(\sqrt{6}\,\cos(8)+\sqrt{-1+3\cos(2\times 8)}\right)\right)=\frac{1}{4}\left(4\log_e\left(\cos(8)\sqrt{6}+\sqrt{-1+3\cos(16)}\right)\sqrt{3}-3\cosh(-8i)\sqrt{-2+6\cosh(-16i)}\right)$$

cosh(x) is the hyperbolic cosine function

$\log_b(x)$ is the base-b logarithm

i is the imaginary unit

Series representations

$$\frac{1}{4}\left(-3\cos(8)\sqrt{-2+6\cos(2\times 8)}+4\sqrt{3}\log\left(\sqrt{6}\cos(8)+\sqrt{-1+3\cos(2\times 8)}\right)\right)=$$
$$\frac{1}{4}\left(4\sqrt{3}\log\left(-1+\sqrt{6}\cos(8)+i\sqrt{1-3\cos(16)}\right)-\right.$$
$$4\sqrt{3}\sum_{k=1}^{\infty}\frac{\left(1-\sqrt{6}\cos(8)-i\sqrt{1-3\cos(16)}\right)^{-k}}{k}-$$
$$\left.3i\sqrt{2}\sqrt{1-3\sum_{k=0}^{\infty}\frac{(-256)^k}{(2k)!}}\sum_{k=0}^{\infty}\frac{(-64)^k}{(2k)!}\right)$$

$$\frac{1}{4}\left(-3\cos(8)\sqrt{-2+6\cos(2\times 8)}+4\sqrt{3}\log\left(\sqrt{6}\cos(8)+\sqrt{-1+3\cos(2\times 8)}\right)\right)=$$
$$\frac{1}{4}\left(4\sqrt{3}\log\left(-1+\sqrt{6}\cos(8)+i\sqrt{1-3\cos(16)}\right)-\right.$$
$$4\sqrt{3}\sum_{k=1}^{\infty}\frac{\left(1-\sqrt{6}\cos(8)-i\sqrt{1-3\cos(16)}\right)^{-k}}{k}+$$
$$\left.3i\sqrt{2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(8-\frac{\pi}{2}\right)^{1+2k}}{(1+2k)!}\right)\sqrt{1+3\sum_{k=0}^{\infty}\frac{(-1)^k\left(16-\frac{\pi}{2}\right)^{1+2k}}{(1+2k)!}}\right)$$

$$\frac{1}{4}\left(-3\cos(8)\sqrt{-2+6\cos(2\times 8)}+4\sqrt{3}\log\left(\sqrt{6}\cos(8)+\sqrt{-1+3\cos(2\times 8)}\right)\right)=$$
$$\frac{1}{4}\left(4\sqrt{3}\log\left(-1+\sqrt{6}\cos(8)+i\sqrt{1-3\cos(16)}\right)-\right.$$
$$4\sqrt{3}\sum_{k=1}^{\infty}\frac{\left(1-\sqrt{6}\cos(8)-i\sqrt{1-3\cos(16)}\right)^{-k}}{k}-$$
$$\left.3i\sqrt{2\pi}\left(\sum_{j=0}^{\infty}\text{Res}_{s=-j}\frac{16^{-s}\Gamma(s)}{\Gamma\left(\frac{1}{2}-s\right)}\right)\sqrt{1-3\sqrt{\pi}\sum_{j=0}^{\infty}\text{Res}_{s=-j}\frac{64^{-s}\Gamma(s)}{\Gamma\left(\frac{1}{2}-s\right)}}\right)$$

$n!$ is the factorial function

$\Gamma(x)$ is the gamma function

Res f is a complex residue
$z=z_0$

Integral representations

$$\frac{1}{4}\left(-3\cos(8)\sqrt{-2+6\cos(2\times 8)}+4\sqrt{3}\log\left(\sqrt{6}\cos(8)+\sqrt{-1+3\cos(2\times 8)}\right)\right)=$$
$$\frac{1}{4}\left(4\sqrt{3}\int_1^{\sqrt{6}\cos(8)+i\sqrt{1-3\cos(16)}}\frac{1}{t}\,dt+\right.$$
$$\left.3\,i\sqrt{2}\sqrt{1+3\int_{\frac{\pi}{2}}^{16}\sin(t)\,dt}\int_{\frac{\pi}{2}}^{8}\sin(t)\,dt\right)$$

$$\frac{1}{4}\left(-3\cos(8)\sqrt{-2+6\cos(2\times 8)}+4\sqrt{3}\log\left(\sqrt{6}\cos(8)+\sqrt{-1+3\cos(2\times 8)}\right)\right)=$$
$$\frac{1}{4}\left(3\,i\sqrt{2}\sqrt{1+3\int_{\frac{\pi}{2}}^{16}\sin(t)\,dt}\int_{\frac{\pi}{2}}^{8}\sin(t)\,dt+\right.$$
$$\left.4\sqrt{3}\log\left(-\sqrt{6}\int_{\frac{\pi}{2}}^{8}\sin(t)\,dt+i\sqrt{1+3\int_{\frac{\pi}{2}}^{16}\sin(t)\,dt}\right)\right)$$

$$\frac{1}{4}\left(-3\cos(8)\sqrt{-2+6\cos(2\times 8)}+4\sqrt{3}\log\left(\sqrt{6}\cos(8)+\sqrt{-1+3\cos(2\times 8)}\right)\right)=$$
$$\frac{1}{2}\left(2\sqrt{3}\int_1^{\sqrt{6}\cos(8)+i\sqrt{1-3\cos(16)}}\frac{1}{t}\,dt-3\,i\sqrt{-1+24\int_0^1\sin(16\,t)\,dt}+\right.$$
$$\left.24\,i\sqrt{-1+24\int_0^1\sin(16\,t)\,dt}\int_0^1\sin(8\,t)\,dt\right)$$

Multiple-argument formulas

$$\frac{1}{4}\left(-3\cos(8)\sqrt{-2+6\cos(2\times 8)}+4\sqrt{3}\log\left(\sqrt{6}\cos(8)+\sqrt{-1+3\cos(2\times 8)}\right)\right)=$$
$$-\frac{3}{2}\,i\cos(8)\sqrt{\frac{1}{2}(1-3\cos(16))}+\sqrt{3}\log\left(\sqrt{6}\cos(8)+i\sqrt{1-3\cos(16)}\right)$$

$$\frac{1}{4}\left(-3\cos(8)\sqrt{-2+6\cos(2\times 8)}+4\sqrt{3}\log\left(\sqrt{6}\cos(8)+\sqrt{-1+3\cos(2\times 8)}\right)\right)=$$
$$\frac{1}{4}\left(-3i\left(-1+2\cos^2(4)\right)\sqrt{2-6\left(-1+2\cos^2(8)\right)}+\right.$$
$$\left.4\sqrt{3}\log\left(\sqrt{6}\left(-1+2\cos^2(4)\right)+i\sqrt{1-3\left(-1+2\cos^2(8)\right)}\right)\right)$$

From which, after some calculations:

sqrt(1/4 (-3 cos(8) sqrt(-2 + 6 cos(2*8)) + 4 sqrt(3) log(sqrt(6) cos(8) + sqrt(-1 + 3 cos(2*8))))-((2√2)/π)*i)

Input

$$\sqrt{\left(\frac{1}{4}\left(-3\cos(8)\sqrt{-2+6\cos(2\times 8)}+4\sqrt{3}\log\left(\sqrt{6}\cos(8)+\sqrt{-1+3\cos(2\times 8)}\right)\right)-\frac{2\sqrt{2}}{\pi}i\right)}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

Exact result

$$\sqrt{\left(\frac{1}{4}\left(4\sqrt{3}\log\left(\sqrt{6}\cos(8)+i\sqrt{1-3\cos(16)}\right)-3i\cos(8)\sqrt{2-6\cos(16)}\right)-\frac{2i\sqrt{2}}{\pi}\right)}$$

Decimal approximation

1.399091446543384174477972125628152083710263653974758966432886 44…

\+

0.869994679258393821102439279997036122710599828503508713137697793…

i

Alternate complex forms

$$1.3991 + 0.8700\,i$$

$$1.6475\,(\cos(0.55632) + i\sin(0.55632))$$

$$1.6475\,e^{0.55632\,i}$$

Polar coordinates

$r = 1.64754$ (radius), $\theta = 0.556315$ (angle)

1.64754 ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$\frac{1}{2}\sqrt{-\frac{8\,i\,\sqrt{2}}{\pi} - 3\,i\cos(8)\,\sqrt{2-6\cos(16)} + 4\,\sqrt{3}\,\log\left(\sqrt{6}\,\cos(8) + i\,\sqrt{1-3\cos(16)}\right)}$$

$$\sqrt{\left(\frac{1}{4}\left(4\,\sqrt{3}\left(\frac{1}{2}\log\left(1+6\cos^2(8)-3\cos(16)\right)+i\left(\pi+\tan^{-1}\left(\sqrt{\frac{1}{6}\,(1-3\cos(16))}\,\sec(8)\right)\right)\right)-3\,i\cos(8)\,\sqrt{2-6\cos(16)}\right)-\frac{2\,i\,\sqrt{2}}{\pi}\right)}$$

$$\sqrt{\left(\frac{1}{4}\left(4\sqrt{3}\,\log\left(i\sqrt{1-\frac{3}{2}\left(e^{-16i}+e^{16i}\right)}+\sqrt{\frac{3}{2}}\left(e^{-8i}+e^{8i}\right)\right)-\frac{3}{2}i\sqrt{2-3\left(e^{-16i}+e^{16i}\right)}\left(e^{-8i}+e^{8i}\right)\right)-\frac{2i\sqrt{2}}{\pi}\right)}$$

$\sec(x)$ is the secant function

$\tan^{-1}(x)$ is the inverse tangent function

From

“Nuova Teoria Sismica delle Maree” – *Giulio Grablovitz* – 1876

(in Italian)

...In conseguenza della marea diurna, si genera fra il settentrione del Mare Adriatico e le parti meridionali del Mediterraneo, un' altalena ondosa, che per la sua regolarità non cesserebbe d'un tratto, se anche cessasse l'azione luni-solare; per tal motivo i suoi movimenti non corrispondono alle posizioni astronomiche del giorno in cui avvengono, ma a quelle di 3 giorni prima e l'alta o la bassa marea succede da 2 a 3 ore dopo il passaggio al meridiano; di conseguenza raggiunge il suo massimo dopo il passaggio più vicino allo zenith od al nadir ed il minimo dopo quello più lontano da uno dei detti punti.

21 Luglio 2024	**LUNA PIENA** alle 10:16	29°08’

(10h 16m)

Input interpretation

10 hours 16 minutes

Results

10.27 hours

616 minutes

Unit conversions

36 960 seconds

39960 seconds = 11.1°

(29° 08’ + 11.1°)

Input interpretation

29 degrees 8 arcminutes + 11.1° (degrees)

Results

40 degrees 14 arcminutes

40° 14’

11.1°

Input interpretation

11.1° (degrees)

Unit conversions

193.7 mrad (milliradians)

0.1937 radians

11 degrees 6 arcminutes

11° 6’

Venice Tides

B A

B A

(1h 5m)

Input interpretation

1 hour 5 minutes

Results

1.083 hours

65 minutes

Unit conversion

3900 seconds

3600 seconds = 1°

(7h 40m)

Input interpretation

7 hours 40 minutes

Results

7.667 hours

460 minutes

Unit conversions

27 600 seconds

27600 seconds = 7.666666666667°

(11h 00m)

Input interpretation

11 hours

Results

11 hours

660 minutes

Unit conversions

39 600 seconds

39600 seconds = 11°

(18h 25m)

Input interpretation

18 hours 25 minutes

Results

18.42 hours

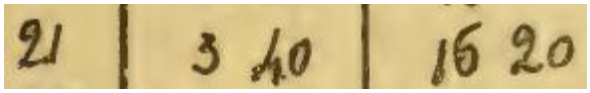
1105 minutes

Unit conversions

66300 seconds

66300 seconds = 18.41666666667°

Ischia Tides:



A A

(3h 40m)

Input interpretation

3 hours 40 minutes

Results

3.667 hours

220 minutes

Unit conversions

13 200 seconds

13200 seconds = 3.666666666667°

(16h 20m)

Input interpretation

16 hours 20 minutes

Results

16.33 hours

980 minutes

Unit conversions

58 800 seconds

58800 seconds = 16.33333333333°

We obtain:

(-1°-
7.666666666667°+11°+18.41666666667°+3.666666666667°+16.33333333333°)

-B - A (Venice tides) + B + A (Venice tides) + A + A (Ischia tides)

Input interpretation

−1° (degrees) − 7.666666666667° (degrees) +
11° (degrees) + 18.41666666667° (degrees) +
3.666666666667° (degrees) + 16.33333333333° (degrees)

Result

40.75° (degrees)

Unit conversions

711.221670188 mrad (milliradians)

0.711221670188 radians

---

40 degrees 45 arcminutes

40° 45’

40 degrees 45 arcminutes

Input interpretation

40 degrees 45 arcminutes

Result

40.75° (degrees)

Unit conversions

711.2 mrad (milliradians)

0.7112 radians

From

0.7112 radians

we obtain:

55*1/((24/(0.7112))+1/Pi)

Input

$$55 \times \frac{1}{\frac{24}{0.7112} + \frac{1}{\pi}}$$

Result

1.614603452320878317269853016452719887281872568080179703777636330 1
…

1.61460345232…. result that is a good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternative representations

$$\frac{55}{\frac{24}{0.7112} + \frac{1}{\pi}} = \frac{55}{\frac{24}{0.7112} + \frac{1}{180^\circ}}$$

$$\frac{55}{\frac{24}{0.7112} + \frac{1}{\pi}} = \frac{55}{\frac{24}{0.7112} + -\frac{1}{i \log(-1)}}$$

$$\frac{55}{\frac{24}{0.7112}+\frac{1}{\pi}} = \frac{55}{\frac{24}{0.7112}+\frac{1}{\cos^{-1}(-1)}}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\frac{55}{\frac{24}{0.7112}+\frac{1}{\pi}} = \frac{55}{33.7458+\frac{1}{4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}}}$$

$$\frac{55}{\frac{24}{0.7112}+\frac{1}{\pi}} = \frac{55}{33.7458+\frac{1}{-2+2\sum_{k=1}^{\infty}\frac{2^k}{\binom{2\,k}{k}}}}$$

$$\frac{55}{\frac{24}{0.7112}+\frac{1}{\pi}} = \frac{55}{33.7458+\frac{1}{x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}}} \quad \text{for } (x \in \mathbb{R} \text{ and } x > 0)$$

$\binom{n}{m}$ is the binomial coefficient

$\mathbb{R}$ is the set of real numbers

Integral representations

$$\frac{55}{\frac{24}{0.7112}+\frac{1}{\pi}} = \frac{55}{33.7458+\frac{1}{2\int_0^{\infty}\frac{1}{1+t^2}\,dt}}$$

$$\frac{55}{\frac{24}{0.7112}+\frac{1}{\pi}}=\frac{55}{33.7458+\frac{1}{4\int_0^1\sqrt{1-t^2}\,dt}}$$

$$\frac{55}{\frac{24}{0.7112}+\frac{1}{\pi}}=\frac{55}{33.7458+\frac{1}{2\int_0^\infty\frac{\sin(t)}{t}\,dt}}$$

(55+1)*1/((24/(0.7112))+1/Pi)

Input

$$(55+1)\times\frac{1}{\frac{24}{0.7112}+\frac{1}{\pi}}$$

Result

1.643959878726712468492941253115496612505179342045273880209956990 6…

1.643959878…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternative representations

$$\frac{55+1}{\frac{24}{0.7112}+\frac{1}{\pi}}=\frac{56}{\frac{24}{0.7112}+\frac{1}{180^\circ}}$$

$$\frac{55+1}{\frac{24}{0.7112}+\frac{1}{\pi}}=\frac{56}{\frac{24}{0.7112}+-\frac{1}{i\log(-1)}}$$

$$\frac{55+1}{\frac{24}{0.7112}+\frac{1}{\pi}} = \frac{56}{\frac{24}{0.7112}+\frac{1}{\cos^{-1}(-1)}}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\frac{55+1}{\frac{24}{0.7112}+\frac{1}{\pi}} = \frac{56}{33.7458+\frac{1}{4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}}}$$

$$\frac{55+1}{\frac{24}{0.7112}+\frac{1}{\pi}} = \frac{56}{33.7458+\frac{1}{-2+2\sum_{k=1}^{\infty}\frac{2^k}{\binom{2\,k}{k}}}}$$

$$\frac{55+1}{\frac{24}{0.7112}+\frac{1}{\pi}} = \frac{56}{33.7458+\frac{1}{x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}}} \quad \text{for } (x \in \mathbb{R} \text{ and } x > 0)$$

$\binom{n}{m}$ is the binomial coefficient

$\mathbb{R}$ is the set of real numbers

Integral representations

$$\frac{55+1}{\frac{24}{0.7112}+\frac{1}{\pi}} = \frac{56}{33.7458+\frac{1}{2\int_0^{\infty}\frac{1}{1+t^2}\,dt}}$$

$$\frac{55+1}{\frac{24}{0.7112}+\frac{1}{\pi}} = \frac{56}{33.7458+\frac{1}{4\int_0^1 \sqrt{1-t^2}\,dt}}$$

$$\frac{55+1}{\frac{24}{0.7112}+\frac{1}{\pi}} = \frac{56}{33.7458+\frac{1}{2\int_0^\infty \frac{\sin(t)}{t}\,dt}}$$

121*((24/(0.7112)))+13-1/4

Input

$$121\times\frac{24}{0.7112}+13-\frac{1}{4}$$

Result

4095.98959505061867266591676040494938132733408323959505061867266 59

…

4095.98959505…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson.

This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

27sqrt(121*((24/(0.7112)))+13-1/4)+1

Input

$$27\sqrt{121\times\frac{24}{0.7112}+13-\frac{1}{4}}+1$$

Result

1729.00…

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number).

Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

And:

(11.1°+3.666666666667°-1°)

Input interpretation

11.1° (degrees) + 3.666666666667° (degrees) − 1° (degree)

Result

13.77° (degrees)

Unit conversions

240.3 mrad (milliradians)

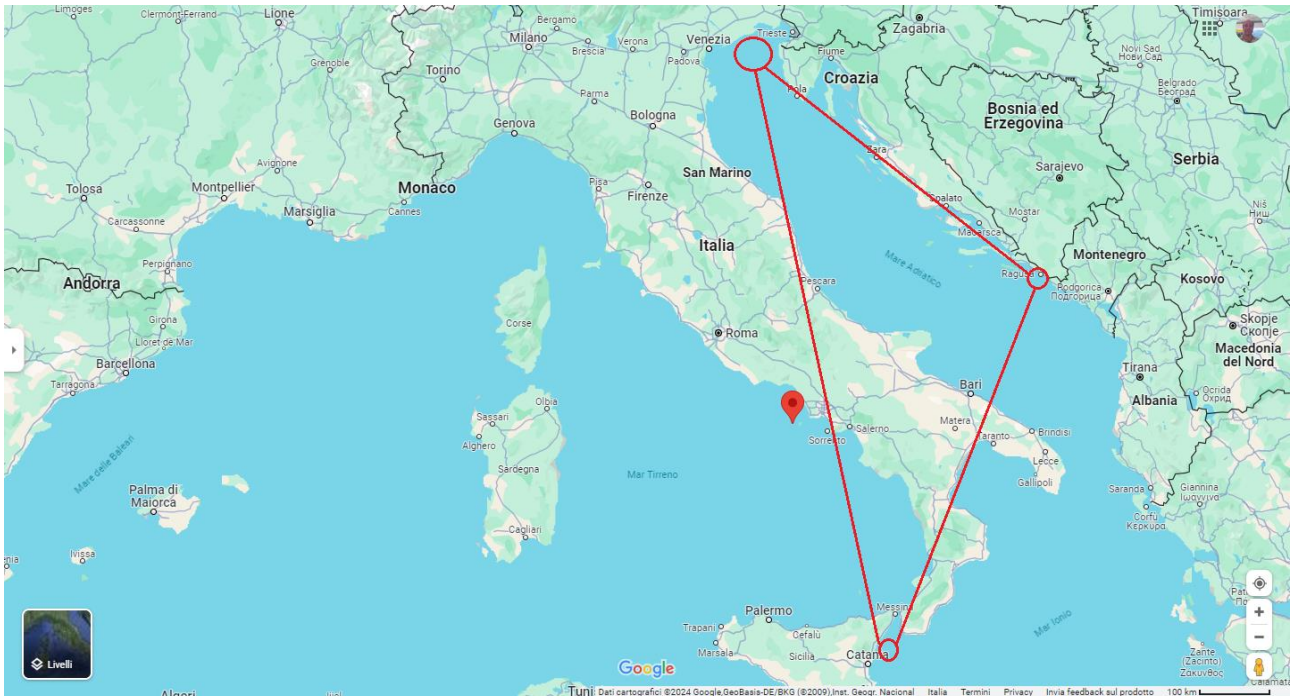
0.2403 radians

---

13 degrees 46 arcminutes

13° 46’

40° 45’ N 13° 46’ E = Forio, Città Metropolitana di Napoli



Or:

(11.1°+3.666666666667°-1/sqrt2*((2sqrt2)/Pi)°)

Input interpretation

$$11.1^\circ \text{ (degrees)} + 3.666666666667^\circ \text{ (degrees)} - \frac{1}{\sqrt{2}} \times \frac{2\sqrt{2}}{\pi}^\circ \text{ (degrees)}$$

Result

14.13° (degrees)

Unit conversions

246.6 mrad (milliradians)

0.2466 radians

---

14 degrees 7 arcminutes 50 arcseconds

14° 7’

But:

$$\frac{1}{\sqrt{2}} \times \frac{2\sqrt{2}}{\pi}$$

is equal to

$$\frac{2}{\pi}$$

thus:

(11.1°+3.666666666667°-2/π°)

Input interpretation

$11.1°$ (degrees) + $3.666666666667°$ (degrees) − $\frac{2}{\pi}°$ (degrees)

Result

$14.13°$ (degrees)

Unit conversions

246.6 mrad (milliradians)

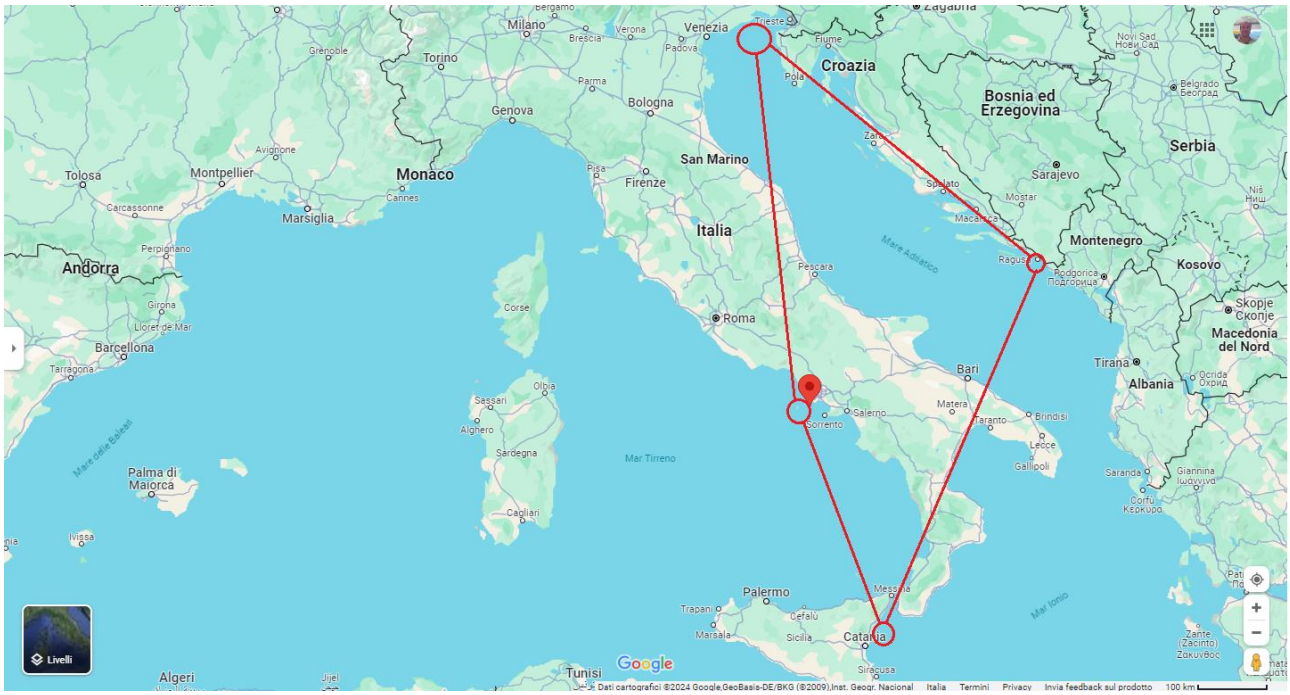
0.2466 radians

---

14 degrees 7 arcminutes 50 arcseconds

14° 7’

40° 45’ N 14° 7’ E = Napoli, Città Metropolitana di Napoli



Summary 2. Possible connections and extensions between the lines of greatest shaking. It is clear that the main radiants are: Antilles/Gulf of Mexico-Bay of Fundy, Adriatic/Etna, Philippines-Guinea

Observations and conclusions

Electromagnetic phenomena accompany periods of earthquakes, and which at that time often take the place of telluric motions. In addition to this, they predominate every year during one or two months which chooses between March and May or, at the latest, enters June and July. **The activity of the sun is the center of electromagnetic phenomena** (Michele Stefano De Rossi – "Meteorologia Endogena")

Recall that tidal force (generally used in the plural, tidal forces or tidal forces, and also with the expression tidal effects) is a secondary effect of the **force of gravity**. Tidal effects from different bodies can add up, as in the case of the alignment between the Moon and the Sun which gives rise to intense syzygial tides.

The undoubted correlation that Prof. De Rossi felt between the Corleone earthquakes and those of Monte Baldo last year moved me to pay special attention to the latter as well. Rummaging through the scientific yearbooks, I found the precise dates of the strongest earthquakes felt in 1866 on the slopes of Monte Baldo, namely: 13 June, 11 August and 7-8 November, which correspond to the new moons; in 1870 seismic activity reawakened there, but I don't know the dates; in 1876 the first strong shock occurred on April 23, that is, on the eve of the new moon; with the perigee (which took place on the 26th) the shocks prepared by the new moon continued until the 29th; then the frequency decreased until May 4th and it already seemed to have left those populations in peace; except that the next coincidence of the new moon with the perigee and with a strong northern declination (in which position, as I already said, one of the two passages to the meridian is an energetic occasion for an earthquake) provided me with such a clue of awakening, probably on a greater extent of land , that here I prepared myself for careful surveillance, so as not to miss the most important phases of the phenomenon, when this happened. I mentioned this probability to Prof. Don Timoteo Bertelli of Florence in my letter of May 1st and to Prof. Goiran of Verona in a letter of the same 12th. The critical day otherwise passed peacefully in Trieste; not so in Monte Baldo, where the tremors resumed on the 22nd and continued on the 23rd, to be repeated on the 29th; at the same time in Corleone the activity, which had seemed almost extinguished since the 10th, was reawakened with a shock on the 20th, one on the 21st, four on the 24th and with great energy on the 25th. On May 22nd, the eve of the new moon, the very strong earthquake also occurred of Spoleto and at the time of the new moon in question there was, it can be said, no region of the Apennines in which seismic activity did not manifest itself with greater or lesser force, as can be seen from the bulletin.

In Monte Baldo there was a truce during June; in July the tremors resumed the day after the full moon and continued thereafter without interruption; in the following months tremors were noted on August 7th, September 5th, October 9th and November 4th, that is, almost always one or two days after the full moon. It is remarkable that on May 22nd and 23rd, while the rest of Italy was shaking, there was a truce in Corleone and then an immediate awakening, and the truce that occurred in the new moons following Monte Baldo in the face of energy is equally significant. manifested itself at the same time as Corleone, where the endogenous forces were transported by geological-mechanical effects, which it is not my task to erudite. In 1870, as far as I can remember, the seismic period of Monte Baldo put an end to that of Monte Nevoso (Julian Alps). This began on February 28th with a strong tremor at 12.20 pm; the next day the shocks were repeated and so also on the day of the new moon, March 2, and the following; after a fifteen-day truce a shock was felt at the full moon; then there were other tremors, the dates of which I could not know; those that came to my attention, and were the strongest, occurred on April 28th (the eve of the new moon), on May 10th, on May 15th (full moon), on June 2nd (near the new moon) and several between the 13th and the 19th. June (full moon period). Then the activity died down there and arose in Monte Baldo. Monte Nevoso was frequently subject to earthquakes; in relatively recent times there was a long period from November 1750 to May 1753; and in 1838 the populations remained in suspense for three months. That local area includes the city of Rijeka; and even in the small earthquakes, which occur here from time to time, I have observed a decided prevalence of syzygies. From this we see that some seismic periods, although limited within very narrow boundaries, can be the effect of a large telluric cause. I took the Corleone period into special consideration, because this is one of the few whose phases have been carefully studied and from which there is a sufficiently large number of shocks to draw positive consequences. There was another seismic period of recent memory and well studied, that of Belluno; the existing relationship between it and the lunar positions has no need of my demonstrations, because the illustrious Falb proved it since he predicted, based on his theories, the return of the phenomenon even during the course of the period itself.

Perhaps all the seismic phenomena that occur in Italy have as their cause, if not direct, at least determining, the action of the stars, but while on the one hand the lack of sufficient observations does not allow very extensive studies, on the other hand the translocation, which often happens, seismic centers distract the attention of investigators so as not to allow them to glimpse the effects of a great common cause in isolated phenomena.

It is desirable that the invitation made repeatedly by Prof. Cav. De Rossi, in order to obtain the greatest possible number of reports on seismic phenomena, must be listened to by those who have the progress of science at heart and that no one abstains from communicating even crude observations of such phenomena, the memory of which without this could be lost to the detriment of science. (**DELL' ATTRAZIONE LUNI- SOLARE IN RELAZIONE COI FENOMENI MAREO – SISMICI** - STUDI DIMOSTRATIVI DI GIULIO GRABLOVITZ – 1877)

In conclusion:

While **the activity of the sun is the center of electromagnetic phenomena,** the tidal force, hence the luni-solar attraction, is a secondary effect of the **force of gravity**. The **aurora borealis**, for example, is a phenomenon visually characterized by luminous bands that take on a wide range of shapes and colours, rapidly changing in time and space, usually red-green-blue in colour, called auroral arcs, caused from the interaction of charged particles (protons and electrons) of solar origin (solar wind) with the terrestrial ionosphere (atmosphere between 100-500 km): these particles excite the atoms of the atmosphere which, subsequently de-energizing, emit light of various lengths 'wave. Solar activity is a source of emission of **electromagnetic waves** and **electrically charged particles**, the luni-solar attraction, is a secondary effect of the **force of gravity**. It is therefore possible to hypothesize a connection, albeit indirect, between these phenomena and "**gravitational waves**" which, among other things, travel at a speed equal to c (speed of light), as well as **electromagnetic waves**. Thus, there is a purely mathematical connection between seismic waves and gravitational waves.

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

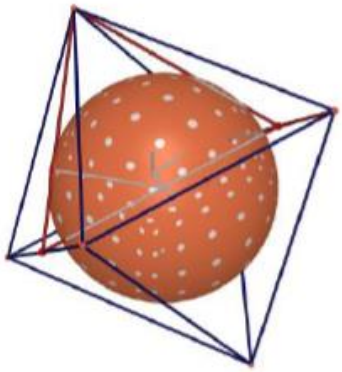


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\ l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.14193957152658430892433073219616263267751338681165904468254173 93

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

$4096 = 64^2$, (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$).

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.61805\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^8\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^8\right)^k}{k!}\right)\quad\text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$
$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi e^0 \approx 3.1416$ (real, principal root)

$\pi e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1\sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003$ (real, principal root)

$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003$ (real root)

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\pi\left\lfloor\frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{8}{\pi^2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.6180085459001070581002623979536005212943435960226956084921288971

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} = \sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} = \sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\mathrm{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13

…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\Big/\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}(C\times \mathrm{R}\times 2.33\cdot 10^{-13})}} \cong 1.61803398\ldots = \frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.6180359123482642354401744088347098542545273508401733563064818107 …

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\, x^2\, y\, z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$ is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.6018401361\times 10^{-24}\right)}}$$

1.618032997307532491506757016629746746422577260892967140791939590 3
…

1.6180329973075…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.4525642121\times 10^{-24}\right)}}$$

Result

1.644932352102092130483898983704151168876621841655166877914166033 8
…

1.64493235210209213…. ≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

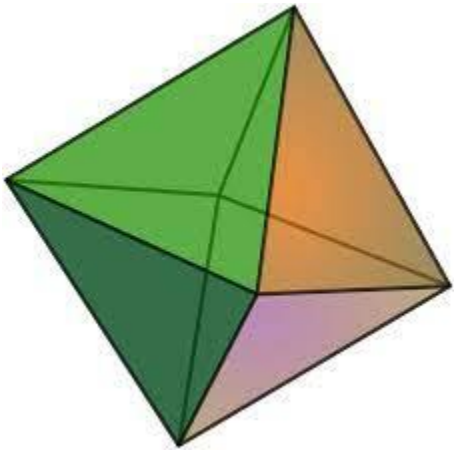
Result

3.14159225731469939950039231605796469731171781644423955790024797

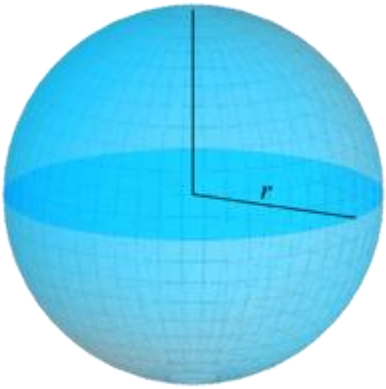
…

3.14159225731469…. ≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find *a*, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

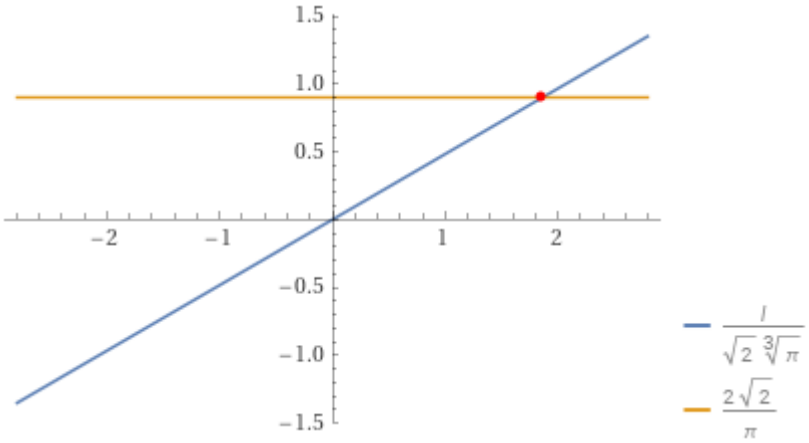
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32 \cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}};\ a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **$f_0(1710)$ scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256x^8 + 95\,744x^7 - 3\,248\,750\,080x^6 - 914\,210\,725\,504x^5 + 15\,498\,355\,554\,921\,184x^4 + 2\,911\,478\,392\,539\,914\,656x^3 - 32\,941\,144\,911\,224\,677\,091\,680x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

$1.64381856858\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\wedge(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-\right.\right.\right.\right.$$
$$\left.\left.\left.\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\right/\right.\right.$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\wedge(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-\right.\right.\right.\right.$$
$$\left.\left.\left.\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\right/\right.\right.$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\wedge(1/15)\right)$$
for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\operatorname{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

$-5.010882647757...$

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+...}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\,\sqrt{6}}\right)^2\right\} = 0$$

$$\text{for } b = -\frac{226\,802\,245}{18\,480\,874}$$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

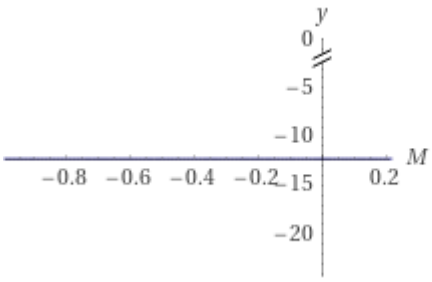
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

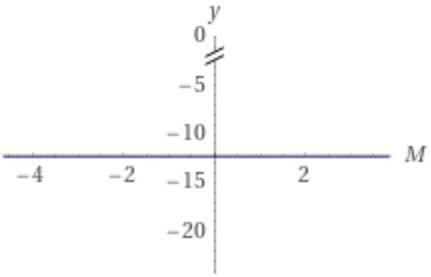
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V = \frac{1}{3}(0.0814845\,b + 1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

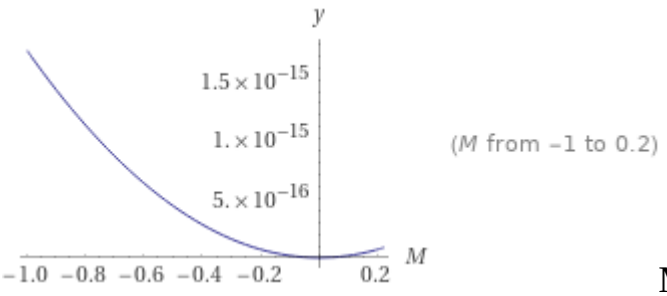
Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\,M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

Result:

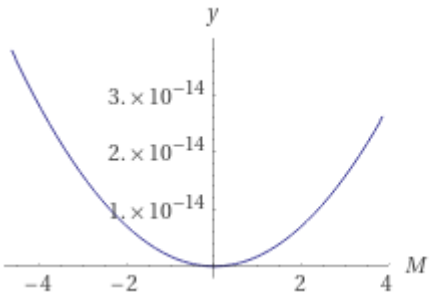
0

Plots: **(possible mathematical connection with an open string)**



M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O\left(M^{62194}\right)$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^\infty \left(\frac{1}{3} M^2 \left(1 + \frac{18.4084 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4} \right)}{M^2} \right)^2 - 1.75541 \times 10^{-15}\, M^2 \right) dM = 0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3} \left(0.0814845 \times \frac{225.913 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4} \right)}{M^2} + 1 \right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3} \left(0.0814845 \times \frac{225.913 \left(-0.054323\, (-0.5)^2 + 6.58545 \times 10^{-10} \sqrt{(-0.5)^4} \right)}{(-0.5)^2} + 1 \right)^2 \left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots \times 10^{-16}$$

-4.38851344947*10^{-16}

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times 10^{-17}$

7.021621519159*10^{-17}

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

1.57986484181*10^-14

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 2^2 + 6.58545 \times 10^{-10}\sqrt{2^4}\right)}{2^2} + 1\right)^2 \times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

7.021621519*10^-15

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_{0}}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\,\hat{}\,(1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

$5.729475 * 10^{-35}$ Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

$1.820306 * 10^{61}$ V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

$5.975498*10^{-8}$ V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

$1.042940*10^{27}$ V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

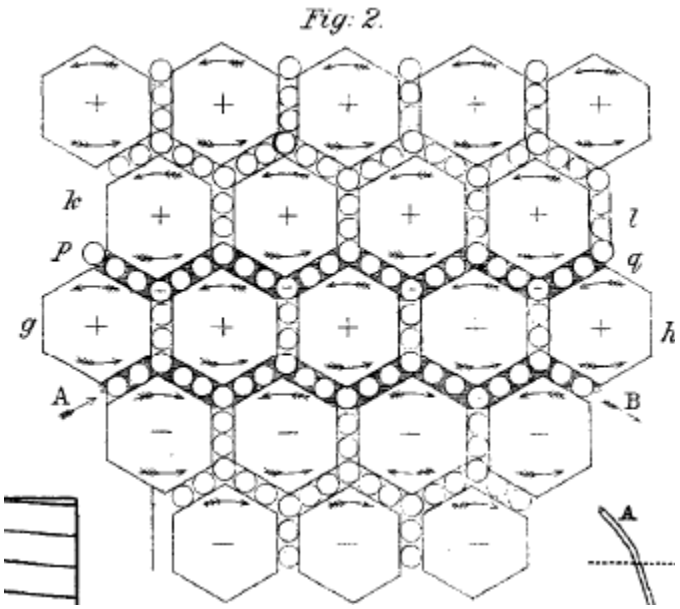
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

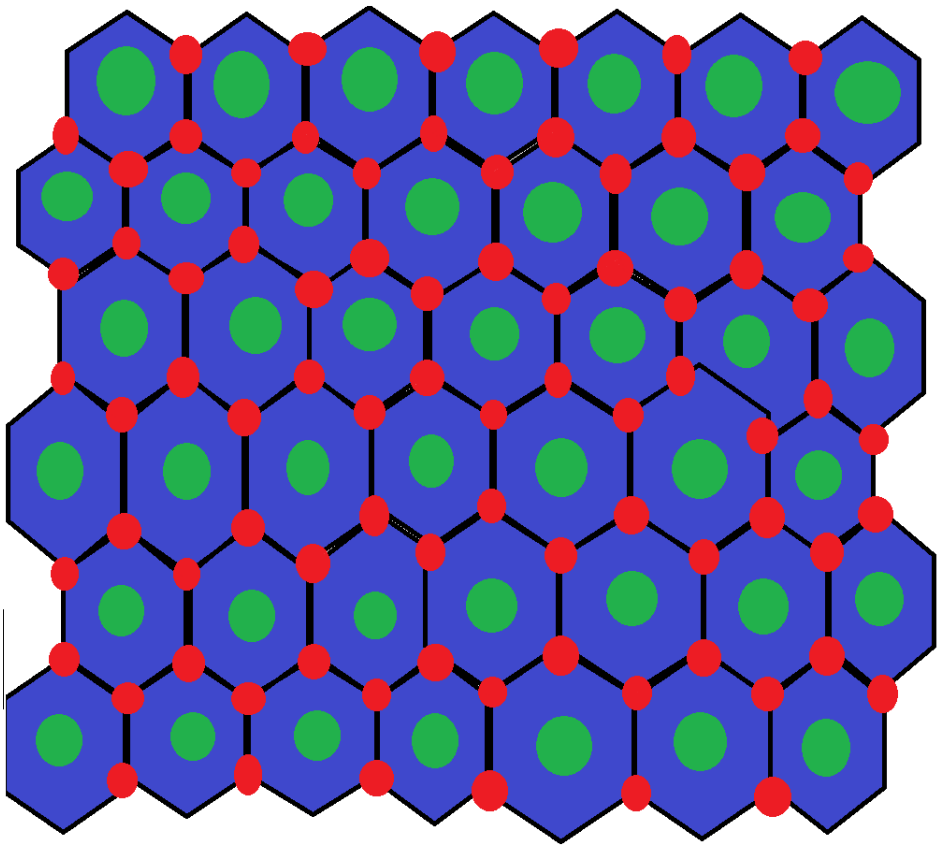
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On the study of various earthquakes, geophysical phenomena and related equations. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory IV

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper, (part IV) we analyze various earthquakes, geophysical phenomena and related equations. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory

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Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico

(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

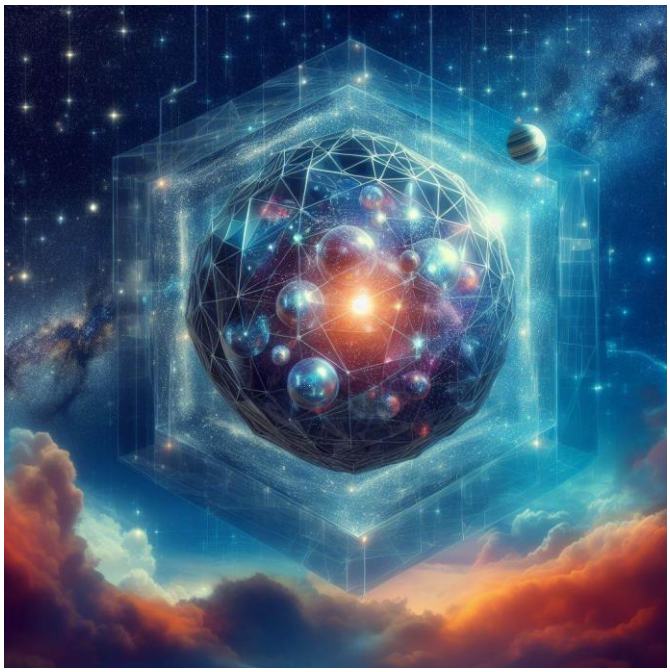
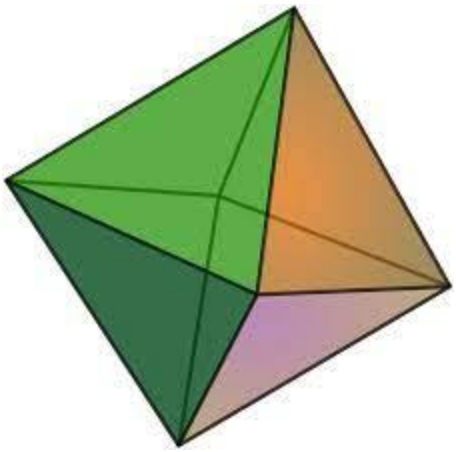
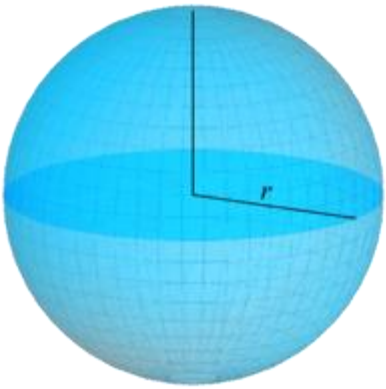


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\,\pi\,x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$$l = 0\,, \quad x = 0$$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi\,x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi\,x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

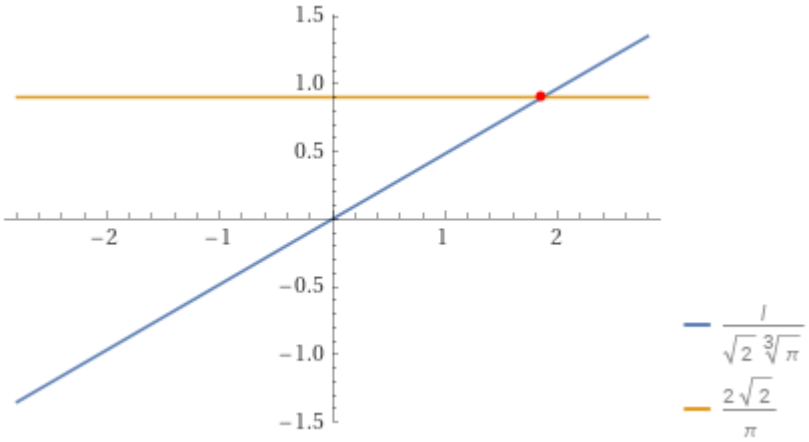
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

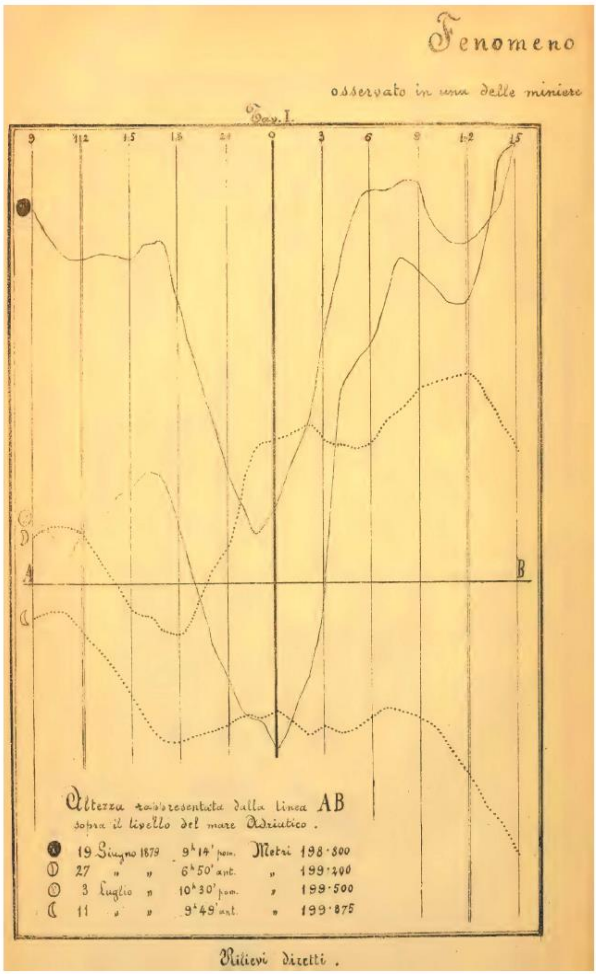
Plot

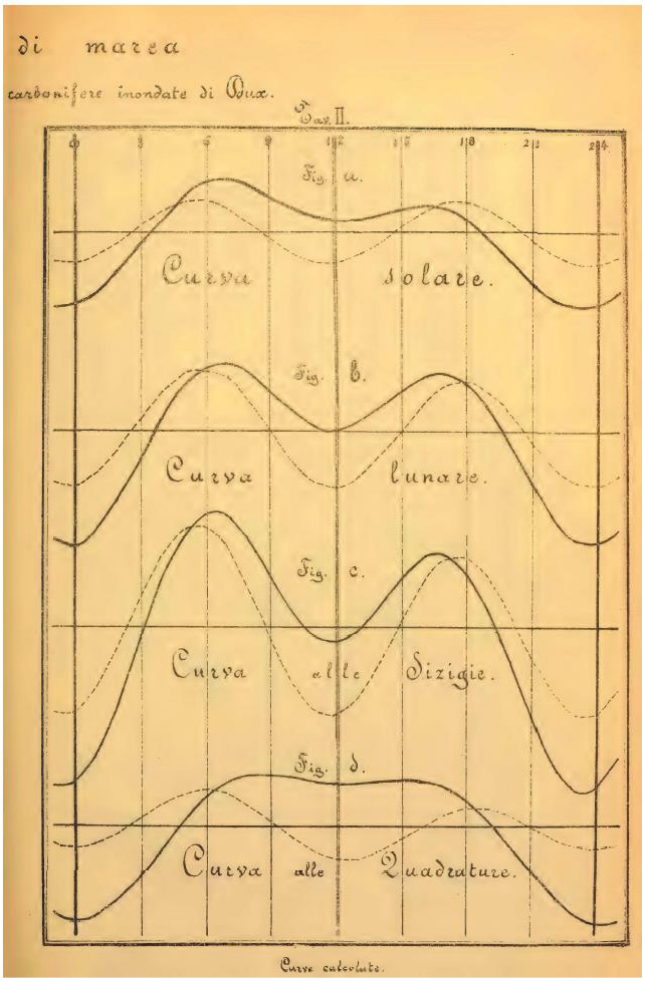


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·800
27 " " 6h 50' ant. " 199·290
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

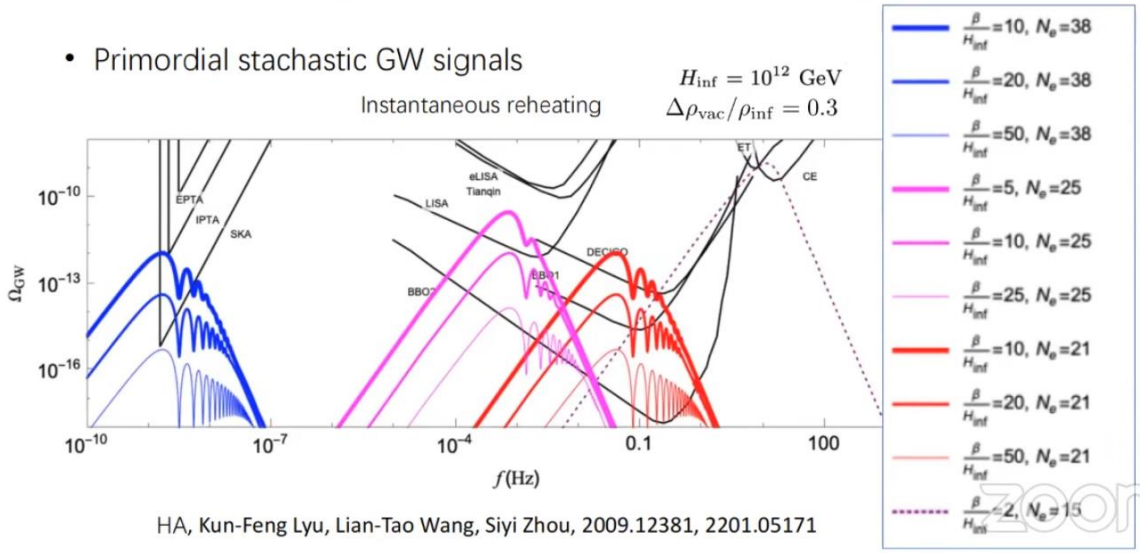

di marea
carbonifere inondate di Aux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating



HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

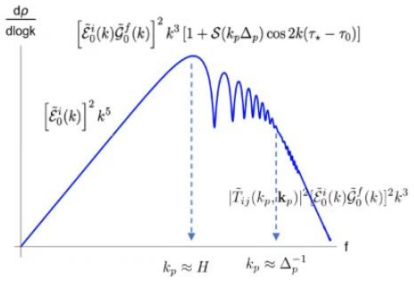
Comparison between primary GW and secondary GW

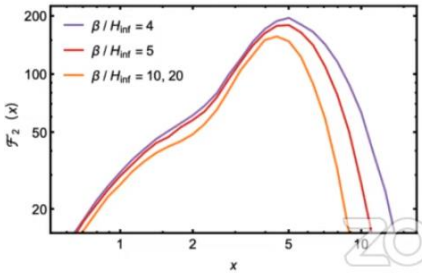
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





Observations on some seismic events: a possible mathematical model for a statistical prevision of the earthquake

Observations on the Earthquake of March 12, 1873 in Central Italy

Ragusa (Dalmazia) – Salisburgo – Aosta - Cosenza

Il fenomeno è passato. Ma quale ne fu la causa, quali le leggi, quali i precedenti, quali le conseguenze, quale l' ordine delle scosse, quali le influenze sugli animali? E poichè una scienza dei terremoti digià esiste, trova essa la scienza sismologica nel terremoto del 12 marzo 1873 nessun fenomeno che disveli nuove leggi o nuove qualità delle forze interiori del nostro pianeta, o che porti a sospettare nuove reciproche influenze tra le forze interne e le esterne atmosferiche o cosmiche? Quanti problemi in un solo fenomeno! Di tutti cercheremo la soluzione certa o probabile.

Adunque dove scoppiò la gran mina che la sera del 12 Marzo fe' traballare l' immenso quadrilatero che ha per suoi vertici Ragusa, Salisburgo, Aosta, Cosenza? E se non fu un' esplosione vulcanica nelle viscere del globo, ma piuttosto una bufera o marea d' irrequieti vapori o bollenti lave (terribili furie che abitano l' interno del nostro pianeta), dove percosse in prima quella bufera o marea?

On the Central Italy earthquake of 03.12.1873

« Sono circa le 9 di sera del giorno 12 marzo; un rombo si sente romoreggiare non sotterra, ma piuttosto per l'aria. Quest'urlo precursore fu sentito in qualche luogo anche dall'interno delle case, ma meglio e più forte fu avvertito nella campagna... Ché cosa è che lo produce? di dove viene? di sotterra od è nell'aria? A ciò il dotto P. Serpieri non risponde; e pensa che fosse nell'aria libera... Possiamo ammettere quale assioma, che il rombo, quando rombo v'è, è solito preannunciare l'arrivo imminente di un terremoto e talvolta si sente anche quando ha fatta la sua strage. »

« Questo rumore non era ancora cessato, che ad un tratto, appena battute le 9 di sera, una forte scossa smuoveva tutta quanta l'Italia da Cosenza a Belluno. Dove nacque quel terremoto? Come si estese? Ecco i quesiti a cui egregiamente rispose il chiarissimo P. Serpieri nel suo rapporto

penisola, e quindi venuta di fuori. Egli osserva inoltre che questa stessa onda si è spinta molto innanzi a tramontana ed a mezzogiorno, cioè ad Aosta e Cosenza; mentre il moto perpendicolare al primo corse verso le due spiagge marine, ma non discese e non salì molto nelle latitudini e con una bella figura rappresenta il terremoto come un grande e precipitoso fiume che ha corso da Cosenza ad Aosta o viceversa, e in mille punti ha rotto gli argini spingendosi con forti correnti a destra ed a sinistra ».

« Dalle notizie dall'egregio professore raccolte anzitutto appare che i moti geosismici hanno cominciato a manifestarsi sulla riva orientale dell'Adriatico, e che l'ora media del terremoto da Ragusa a Venezia (tempo di Roma) fu 9 ore 3′ 1/5, mentre le stazioni della penisola, tranne alcune centrali da Firenze a Spoleto hanno tutte un'ora superiore alle 9 ore 4′; ed inoltre i tempi vanno via alzandosi col crescere della latitudine. Difatti l'ora media in cui il terremoto si è fatto sentire nelle località seguenti, distanti l'una dall'altra circa un grado di latitudine è stata per

Ragusa-Sebenico	lat. med.	43°	19	ore	9, 0′ 2/5
Zara-Pola	»	44°	29	»	9, 2′ 1/5
Pisino-Trieste	»	45°	25	»	9, 5′ 3/10

« La progressione, scrive quindi il P. Serpieri, viene anche troppo bella e parlante. In poco più che 2′ le onde passarono dal grado 43 al 44 e nell'istesso tempo corsero dal grado 44 al 45. »

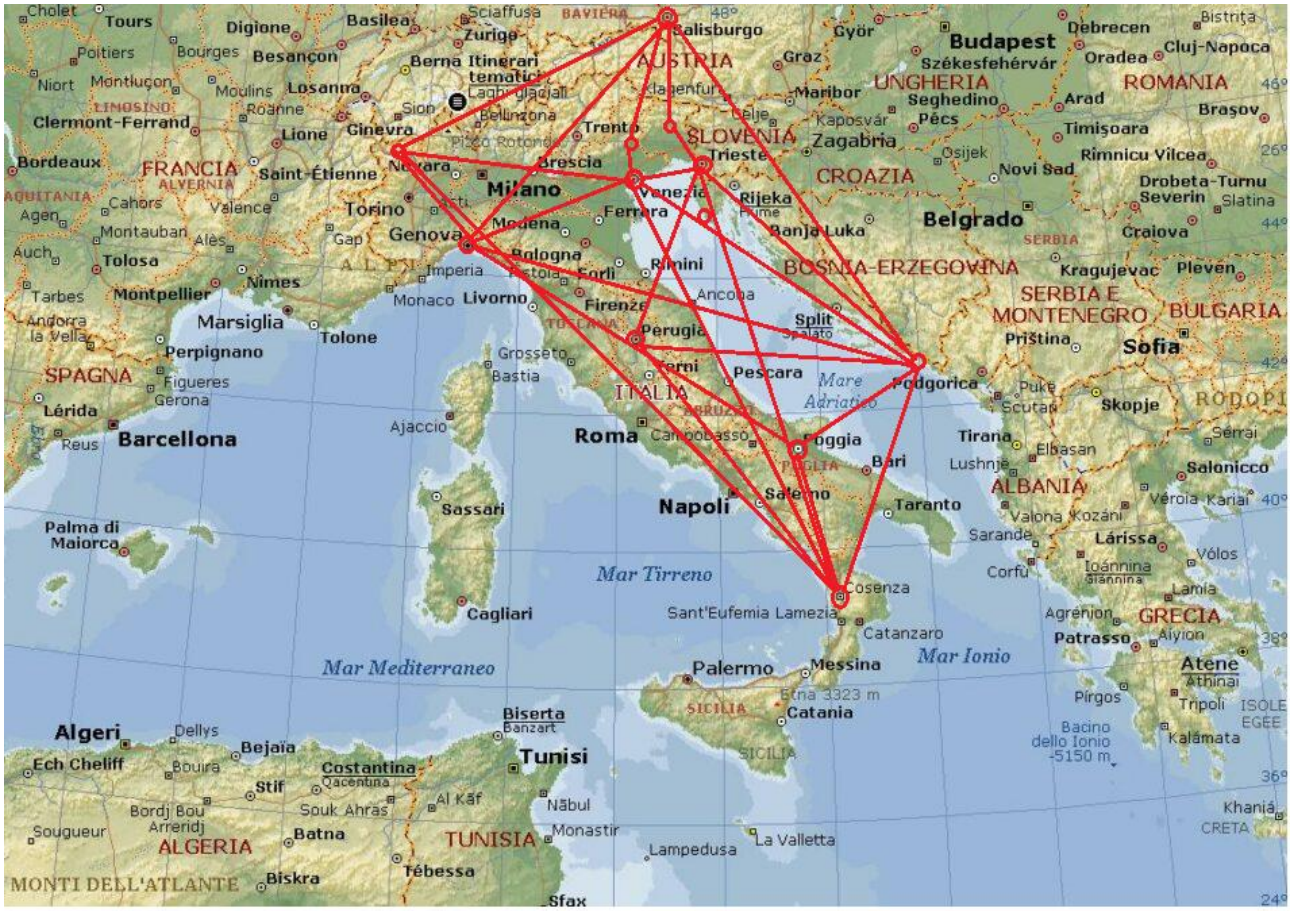
« Se si considera che le prime scosse si fecero sentire a Ragusa a ore 8.56 1/2, a Cosenza, a Todi, a Foligno, a Zara alle ore 9, a Perugia alle ore 9 1', a Firenze a ore 9 3' 5/6, mentre nel resto d'Italia si manifestarono ad ora più tarda e nella valle della Salza l'ondulazione apparve a ore 9 22' 1/2, subito si ravvisa che il movimento nacque realmente verso il centro della Penisola. « Alle origini del Tevere da Fi-

le cento braccia a scuotere con moto convulso ambedue i lidi da Foggia a Venezia, da Cosenza a Genova, e le lontane creste delle Alpi. A tanta potenza e vastità di origine non poteva non corrispondere largo, lontanissimo effetto. »

« Prendendo di mira le stazioni di Ragusa e Venezia, e poi quelle di Spoleto e Venezia, egli calcolò la distanza sopra un arco di circolo massimo della terra, ed ebbe per le prime due 299 miglia o 554 chilometri, e per le seconde 209 miglia o 387 chilometri. La prima distanza percorsa in

« Le altre freccie laterali pure azzurre, segnano le linee d'irraggiamento, e queste, confermando il principio generale, rappresentano veramente i fatti parziali. In un colpo d'occhio si vede come la stessa scossa siasi fatta sentire a Cosenza e ad Aosta, e la freccia lassù sopra Udine, segna la scossa che probabilmente per quella direzione andò fino a Salisburgo e si fece sentire a ore 9, 22' ½ tempo di Roma. »

« Infine nell'Adriatico abbiamo fatto un fascio di freccie con a fianco un punto interrogativo, volendo con questo segnale indicare il supposto punto di provenienza della corrente sdoppiatasi verso l'Italia e verso Dalmazia. »



Salisburgo - Ragusa (Dalmazia) – Aosta – Belluno - Udine – Venezia – Trieste - Pola – Genova – Perugia - Foggia – Cosenza

We note therefore that the earthquake in central Italy of March 12, 1873 was felt from the South (Cosenza, Calabria) to the North (Udine, Friuli-Venezia Giulia) of our peninsula, up to Austria (Salzburg)

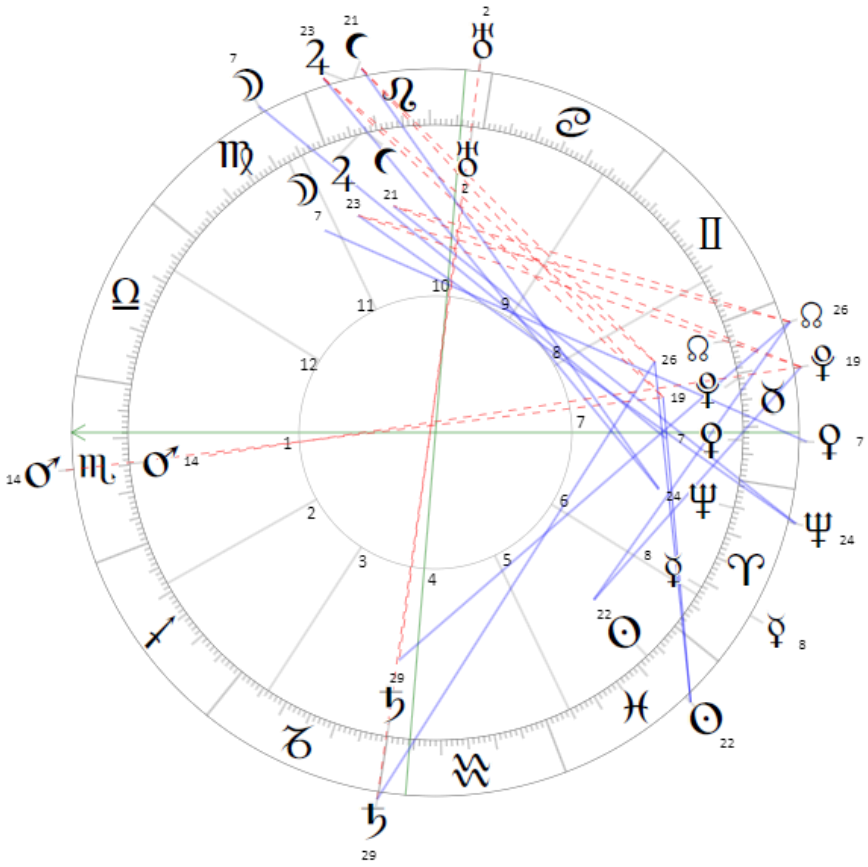
Friday, March 14, 1873 05:44:38 Full Moon 23°44'34 403114.74 km

March 19, 1873 earthquake 7.3 R S. Salvador

March 14, 1873 05:44:38 Full Moon 23°44'34 403114.74 km

March 21, 1873 22:19:38 Last quarter 01°22'57 375835.01 km

Transit sky of Wednesday **12 March 1873** at 21:04:00, Rome, Italy



Nodo lunare – Plutone – Venere – Nettuno – Sole – Mercurio – Saturno – Luna – Giove – Luna – Urano – Marte

Giove-Nettuno; Nettuno-Luna; Saturno-Urano; Luna-Giove-Venere-Nettuno

02/02/1878	9.29	Eclisse anulare.	Meridionale	7.22	17.26

27 January 1880 10:12:16 Full Moon 06°54'44 392030.34 km

Regarding the earthquake of 01.26.1878, we have that:

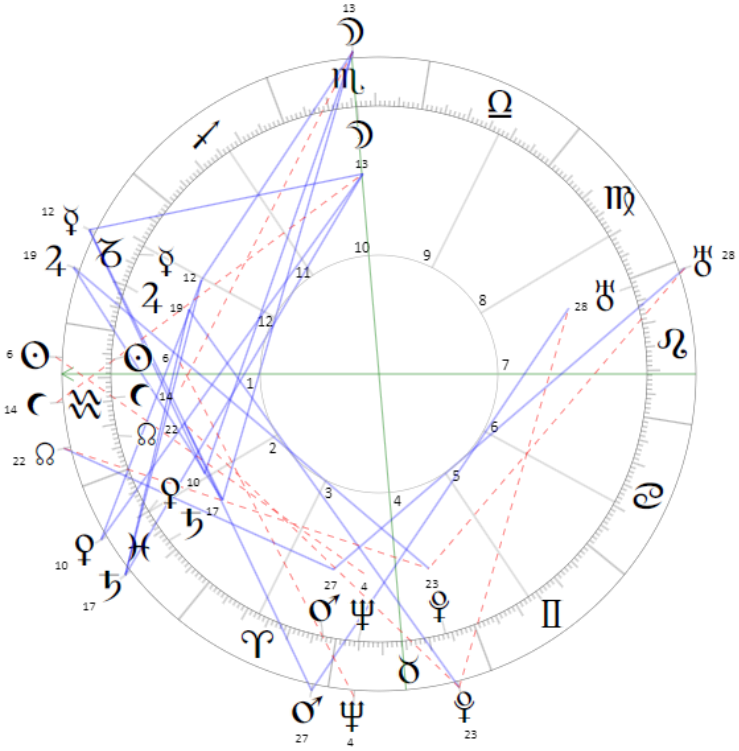
Nel giorno 26 gennaio 1878, alle ore 6, 25 ant. fu avvertito a Lisbona un terremoto preceduto da rombo sotterraneo. La scossa ebbe due impulsi successivi con oscillazioni da E ad O. Durò circa tre secondi. Non furono osservati spostamenti di mobili, ma la maggior parte degli abitanti avvertirono uno scricchiolio nelle impalcature. Ciò av-

Lunedì 28 gennaio 1878, leggere scosse furono avvertite a Rouen, Havre, Caen e lungo tutto il littorale della Manica. Il fenomeno fu sentito anche a Tarbes negli Alti Pirenei, e a Thionville nell'Alsazia.

A Caen il terremoto fu debolmente sentito verso le 11, 45′ a. m. nella direzione di E-O, sola direzione che potè disturbare un orologio a pendolo ed arrestarne il moto. Niun danno ne è avvenuto: tremarono i vetri e i quadri sospesi, ed un provino posato verticalmente cadde rovesciato. È la terza volta che questo fenomeno si fa sentire da 25 anni. Il primo avvenne violentissimo verso il 1859, e il secondo dodici anni fa.

Ho letto quest'oggi col più vivo interesse le notizie che Ella ha pubblicato sui terremoti del 26 e 28 Gennaio, che han scosso il Portogallo, la Francia e l'Inghilterra. Son lieto di farle conoscere, che anche in Italia abbiamo avuto nello stesso periodo un massimo straordinario nelle nostre osservazioni microsismiche; il quale massimo, secondo la legge divenuta già quasi costante, precede i veri sensibili terremoti. Difatti il 25 e il 26 la grande burrasca atmosferica è stata accompagnata qui in Italia da piccole scosse; e queste appunto hanno preceduto il terremoto, che si è manifestato due giorni dopo nella Manica; mentre l'Italia era allora tornata nella più completa tranquillità.

Transit sky of Saturday 26 January 1878 at 06:25:00, Rome, Italy



Luna – Venere; Luna – Giove ; Mercurio – Marte;

09.01.1878 Earth-Sun-Jupiter Conjunction

January 25, 1878 15:49:41 Last quarter 05°36'35 376140.57 km

February 2, 1878 08:17:15 New Moon 13°24'54 403046.19 km

Regarding the eclipses of 1880, we have:

11/01/1880	23.36	Eclisse totale.	Settentrionale	7.37	16.59
07/07/1880	14.10	Eclisse anulare.	Meridionale	4.42	19.47
02/12/1880	4.13	Eclisse parziale. Magnitud. = 0,03	Meridionale	7.20	16.40
31/12/1880	14.42	Eclisse parziale. Magnitud. = 0,71	Settentrionale	7.38	16.49

1880-07-04 08:20 Vallese, Embd

07/07/1880	14.10	Eclisse anulare.	Meridionale	4.42	19.47

7 July 1880 13:21:29 New Moon 15°43'26 404175.72 km

1880-12-01 10 Mistretta Mw = 4.16

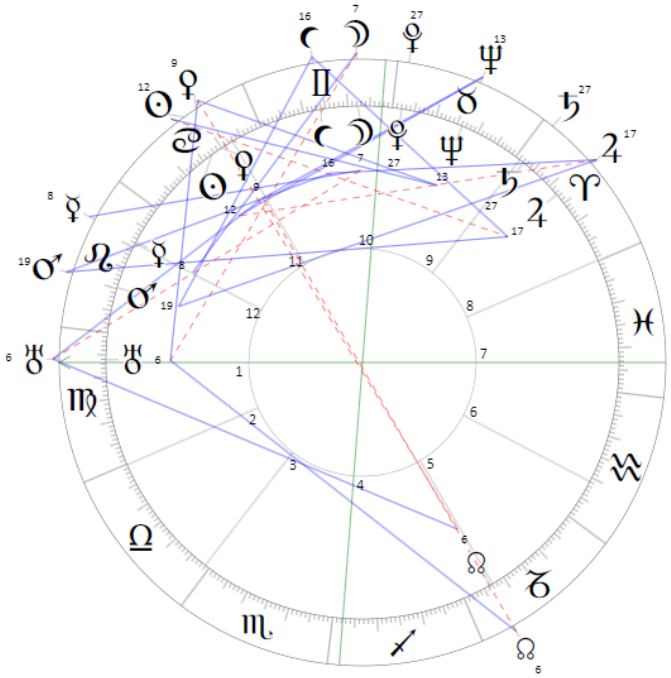
02/12/1880	4.13	Eclisse parziale. Magnitud. = 0,03	Meridionale	7.20	16.40

2 December 1880 02:56:37 New Moon 10°21'56 359428.83 km

(Perigee)

We also have that:

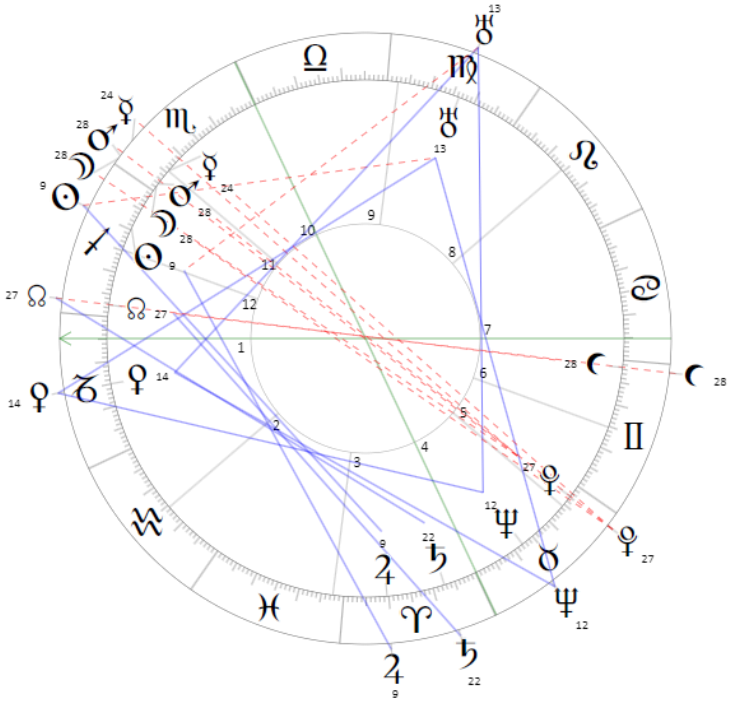
Transit sky of **Sunday 4 July 1880** at 08:20:00, Rome, Italy



Urano-Nettuno; Marte-Nettuno; Urano-Luna; Mercurio-Giove; Nettuno-Luna

Urano-Nettuno-Luna

Transit sky of **Wednesday 1 December 1880** at 08:20:00, Rome, Italy



Luna-Marte-Mercurio -- Plutone

Urano-Nettuno; Urano-Venere; Sole – Giove ; Sole-Saturno;

Sole-Giove-Saturno

28/05/1881	0.51	Eclisse parziale. Magnitud. = 0,73	Settentrionale	4.39	19.35

21/11/1881	17.27	Eclisse anulare.	Meridionale	7.07	16.45

1881-01-24	16:14	Bolognese

30 January 1881 00:48:23 New Moon 10°19'44 359023.06 km

1881-02-12 02:30 Etna - Codavolpe (S. Venerina)

14 February 1881 06:23:54 Full Moon 25°45'08 400516.98 km

1881-03-04 12:05 Casamicciola

28 February 1881 11:32:36 New Moon 10°03'30 365797.97 km

1881-04-23 04:12 Paola

28 April 1881 10:24:45 New Moon 08°14'36 386678.20 km

1881-06-09 Basso Vallese

12 June 1881 06:56:47 Full Moon 21°23'25 362063.98 km

1881-07-22	02:45	Belledonne-Pelvoux

26 Jul 1881 05:19:21 New Moon 03°18'15 406581.25 km

1881-08-03	14:42	Alessandrino
1881-08-05		Belledonne-Pelvoux

9 August 1881 21:07:07 Full Moon 17°20'25 357400.90 km

1881-09-10	07	Chietino

8 September 1881 04:39:47 Full Moon 15°38'25 361473.12 km

1881-09-21	21:20	Tarentaise (Moutiers)
1881-09-28		Cesena
1881-11-05	08:42	Carinthia, Gmuend
1881-11-14	02:55	Montreux
1881-11-25	17:25	Vaud, Aigle
1881-12-04	04:27	Sion
1881-12-17	05:14	Bex

1881-12-28 02 St. Moritz

September 23, 1881	11:54:48	New Moon	00°34'30	397300.47 km
November 6, 1881	02:03:17	Full Moon	13°49'52	380012.05 km
November 13, 1881	23:01:27	Last quarter	21°45'01	404240.24 km
November 21, 1881	16:21:36	New Moon	29°32'50	375651.69 km
December 5, 1881	17:13:56	Full Moon	13°46'23	391336.87 km
January 4, 1882	10:58:48	Full Moon	14°03'17	400790.06 km

The Moon is the closest celestial body to the Earth. Its average distance is 384,400 km. During a lunation, the Earth-Moon distance varies by about 45 thousand km. Furthermore, the maximum (apogee) and minimum (perigee) distances do not remain constant but vary according to non-simple rules. There are many gravitational perturbations that influence the motion of our satellite, consequently it is difficult to predict the real measurements of the apogee and perigee. When the major axis of the lunar orbit is perpendicular to the Earth-Moon line, the difference between the perigee and the apogee is reduced. The minimum Earth-Moon distance will be reached on January 1, 2257 and the minimum on January 7, 2266.

Below are the main data relating to the Earth-Moon distances.

Average apogee 405503 Km

maximum 406720 Km

Average perigee 363296 Km

minimum 356371 Km

Even if it doesn't seem like it, the Earth and the Moon are a binary system, that is, they rotate around each other. The center of gravity of this system is 17 Km below the Earth's surfaces.

Microseismic observations – 1885 earthquakes

OSS. MICROSISM. 1885 Gennajo Decade I.	1	2	3	4	5	6	7	8	9	10	Media	N.d'Os.	Media mensile	N. d'Oss.
Spinea di Mestre	2.37	1.55	1.65	0.72	0.31	1.24	1.13	2.06	1.03	0.00	1.20	40		
Venezia	—	—	—	—	—	—	—	—	—	—	—	—		
Verona	0.09	0.74	0.53	0.97	0.80	0.97	1.06	1.33	0.59	0.97	0.80	46		
Piacenza	0.61	2.05	1.28	0.46	0.77	1.08	0.81	1.34	0.66	0.77	0.98	30		
Moncalieri	1.31	1.36	1.02	1.81	1.86	1.83	1.53	2.11	1.10	0.84	1.17	118		
Alessandria	0.68	2.00	1.32	0.53	0.65	1.08	0.86	1.15	0.55	0.43	0.92	48		
Parma	0.86	1.13	1.05	0.66	0.58	0.58	0.74	2.60	0.69	0.41	0.93	50		
Bologna-S. Luca	1.77	1.35	2.36	0.58	0.67	0.67	0.89	1.09	1.08	0.84	1.08	40		
Chiavari	0.17	2.60	4.44	0.37	0.00	0.49	0.14	1.76	0.37	0.09	0.74	78		
S. Gio: in Galilea	1.40	1.10	2.71	1.92	0.87	1.61	1.53	1.58	1.07	0.33	1.41	71		
Pesaro	6.05	6.47	9.57	2.67	1.68	6.83	5.77	4.62	8.80	0.42	5.18	60		
Firenze t. a.	0.93	2.89	4.19	1.83	1.63	2.43	1.00	3.80	0.73	0.47	1.99	66		
Firenze t. n.	0.81	0.77	1.27	0.71	0.47	0.67	0.55	2.06	0.32	0.50	0 81	66		
Livorno	—	—	—	—	—	—	—	—	—	—	—	—		
Fermo	2.21	2.30	5.68	3.46	6.47	7.63	4.17	2.13	4.37	0.00	3.84	20		
Perugia	1.78	1.78	2.97	2.07	1.18	2.37	2.52	1.48	1.18	0.59	1.79	40		
M. Fortino	4.29	2.87	0.00	2.87	5.74	1.92	1.43	0.00	0.00	1.92	2.10	23		
Spoleto	—	—	—	—	—	—	—	—	—	—	—	—		
Narni	1.69	2.3	1 24	1.69	4.14	1.29	3.63	0.64	0.64	1.49	1.87	32		
Viterbo	0.00	0.53	1.41	1.32	1.58	1.41	0.70	0.53	0.70	0.00	0.81	25		
Aquila	1.11	1.41	1.93	2 43	2.36	4.14	2.48	1.61	1.48	0.41	1.93	50		
Roma	0.58	0.86	1.35	1.20	0.99	1.02	0.93	0.54	0.75	0.22	0.84	72		
Rocca di Papa	2.94	5.79	3.61	4.39	3.17	3.50	4.54	2.18	2.52	1.26	3.39	65		
Velletri	0.84	1.80	2.28	1.41	1.56	1.56	1.44	1.08	1.08	0.48	1.35	331		
Ceccano	0.00	2.93	0.00	0.00	0.87	1.05	0.00	0.00	0.00	0.00	0.48	28		
Foggia	0.77	1.71	1.07	2.27	2.23	2.10	1.71	3.34	1.71	0.34	1.73	40		
Pozzuoli	1.37	3.19	1.67	0.76	0 60	2.12	0.76	0.76	0.60	0.45	1.22	40		
Lecce	—	—	—	—	—	—	—	—	—	—	—	—		
Corleone	1.45	2.41	2.66	1.69	2.90	1.93	2.42	1.69	2.17	2.17	2.14	30		
Acireale	—	—	—	—	—	—	—	—	—	—	—	—		
Catania	0.96	4.23	6.22	5.07	1.94	7.93	1.58	1.02	1.03	1.03	3.09	57		
Med. microsism.	1.42	2.23	2.32	1.68	1.77	2.26	1.70	1.63	1.33	0.61	1.69.	1566		
Numero di scosse	4	3	3	3	4	3	3	2	3	4	Tot. delle sc. 32			
Intens. massima.	5°	4°	3°	1°	4°	1°	2°	3°	1°	1°				

Decade I.ª Incominciando dunque dalla 1.ª decade del Gennaio 1885 non si può non ricordare che in quel periodo ferveva l'attività endogena nell'Andalusia. Di quel periodo ho avuto già più volte occasione di ragionare specialmente nell'Annuario Meteorologico della Società Met. Ital. (Anno I, pag. 168) e vi ho mostrato la connessione continuata delle burrasche sismiche d'ambedue le regioni, tanto che ho chiamato quel periodo Italo-iberico. I moti microsismici furono piuttosto notevoli sempre ed accompagnarono con costante precedenza i massimi sismici che avvennero nei giorni 1, 5 ed 8. La pressione barometrica sempre alta non parve perturbare l'andamento geodinamico.

January 5, 1885 (seismic maximum)

1885-01-05 06 Queyras (Guillestre - Piemonte) M = 4 - 4.19

1 January 1885 05:26:14 Full Moon 11°02'05 357385.29 km

(Perigee)

OSS. MICROSISM. 1885 Gennajo Decade III.	21	22	23	24	25	26	27	28	29	30	31	Media	N.d'Os.	Media mensile	N. d'Oss.
Spinea di Mestre	1. 54	2. 17	1. 34	2. 37	1. 86	0. 41	1. 44	0. 00	0. 00	0. 00	0. 93	1. 09	44		
Venezia	4. 88	4. 11	4. 54	7. 75	2. 51	3. 36	5. 06	1. 28	0. 60	1. 80	2. 97	3. 50	55		
Verona	0. 48	0. 38	0. 19	2. 62	0. 32	1. 76	0. 09	0. 34	0. 09	0. 06	0. 48	0. 61	43		
Piacenza	1. 50	0. 92	1. 03	1. 04	1. 39	0. 97	0. 77	0. 61	0. 66	1. 23	1. 70	1. 07	33		
Moncalieri	1. 18	2. 34	1. 35	1. 24	2. 24	1. 85	1. 42	1. 85	1. 59	1. 67	1. 25	1. 68	132		
Alessandria	0. 24	0. 38	0. 26	0. 45	1. 27	1. 44	0. 31	0. 48	0. 55	1. 49	2. 55	0. 85	55		
Parma	1. 92	0. 70	1. 03	0. 59	2. 11	1. 40	1. 37	0. 82	1. 02	0. 82	2. 16	1. 26	53		
Bologna - S. Luca	2. 02	2. 19	0. 00	2. 95	1. 89	0. 67	1. 01	0. 78	1. 77	0. 56	0. 50	1. 30	41		
Chiavari	0. 27	0. 14	0. 00	0. 39	1. 31	1. 04	0. 00	0. 14	0. 02	0. 76	2. 76	0. 62	61		
S. Gio: in Galilea	1. 51	2. 64	2. 30	2 32	0. 80	1. 53	1. 75	0. 62	0. 25	0. 21	0. 45	1. 30	65		
Pesaro	2. 89	10.41	7. 46	11.40	1. 40	2. 95	6. 75	0. 98	0. 00	0. 00	0. 42	4. 01	06		
Firenze t. a	0. 67	2. 30	1. 76	2. 21	2. 72	1. 96	1. 76	2. 39	1. 14	1. 96	4. 13	2. 09	74		
Firenze t. n	0. 81	0. 51	1. 22	1. 22	1. 22	1. 11	1. 42	1. 01	0. 41	1. 62	2. 64	1. 19	74		
Livorno	—	—	—	—	—	—	—	—	—	—	—	—	—		
Fermo	3. 56	3. 85	3. 46	4. 41	0. 00	2. 11	0. 75	0. 00	0. 00	0. 00	0. 00	1. 64	22		
Perugia	1. 78	2. 97	2. 37	2. 37	1. 04	2. 08	1. 93	1. 04	0. 59	0. 59	0. 74	1. 59	44		
M. Fortino	5. 44	3. 84	0. 00	4. 29	0. 00	0. 00	0. 00	0. 00	0. 95	0. 00	2. 14	1. 46	27		
Spoleto	—	—	—	—	—	—	—	—	—	—	—	—	—		
Narni	3. 18	1. 88	3. 58	1. 48	2. 93	0. 74	3. 38	1. 88	0. 59	2. 18	1. 29	2. 10	33		
Viterbo	1. 05	1. 05	0. 17	0. 88	0. 17	1. 32	1. 23	0. 53	0. 00	0. 00	1. 23	0. 69	31		
Aquila	2. 49	4. 47	2. 90	3. 32	1. 07	1. 54	1. 43	1. 15	0. 45	0. 11	0. 45	1. 76	55		
Roma	1. 38	0. 64	0. 91	1. 74	1. 18	1. 82	1. 25	1. 08	0. 28	0. 38	1. 29	1. 07	96		
Rocca di Papa	3. 51	1. 78	1. 68	4. 46	3. 36	2. 38	3. 17	3. 10	1. 08	0. 84	2. 88	3. 02	89		
Velletri	1. 83	0. 90	1. 30	2. 72	2. 07	2. 00	1. 56	1. 25	0. 37	0. 14	1. 33	1. 40	364		
Ceccano	0. 00	0. 21	0. 00	—	0. 29	0. 00	0. 00	0. 00	0. 00	0. 00	—	0. 05	34		
Foggia	2. 78	1. 67	3. 46	1. 97	1. 16	1. 88	2. 66	0. 86	1. 12	0. 34	0. 04	1. 63	44		
Pozzuoli	1. 21	0. 91	0. 91	1. 06	0. 60	3. 34	2. 43	0. 60	0. 60	0. 00	0. 00	1. 06	44		
Lecce	—	—	—	—	—	—	—	—	—	—	—	—	—		
Corleone	1. 45	1. 93	2. 90	3. 38	2. 65	1. 45	1. 93	1. 45	1. 93	0. 72	0. 72	1. 86	83		
Acireale	—	—	—	—	—	—	—	—	—	—	—	—	—		
Catania	0. 90	2. 79	1. 07	0. 7	5. 61	3. 37	2. 25	1. 16	1. 06	0. 60	0. 41	2. 27	76		
Med. microsism.	2. 03	2. 13	1. 74	2. 66	1. 59	1. 83	1. 74	0. 94	0. 64	0. 66	1. 35	1. 56	1790		
Numero di scosse	10	4	4	14	19	16	9	6	1	2	6	Totale sc. 100			
Intens. massima.	1°	3°	1°	6°	1°	1°	1°	1°	1°	2°	3°				

done i massimi nel 12, 14, 17, 19 e 20 tutte date quasi decadicamente corrispondenti ai massimi della 1.ª decade.

Decade III. I centri di depressione barometrica si fanno sentire sull'Italia nei giorni 21, 23 e 26 coincidendo coll'agitazione microsismica assai notevole. La quale alla sua volta pure accompagnava e precedeva in massimi sismici ossia i terremoti che non forti ma vieppiù numerosi in questa decade ascesero alla totale cifra del centinaio. I loro maggiori gruppi apparvero ai 21-22, ai 24-28, 31 nuovamente, cioè con distanze approssimativamente decadiche dai precedenti.

M. S. DE ROSSI.

22-23-24 January 1885 (seismic maximum)

1885-01-24 20 Liguria occidentale Mw = 4.40

January 24, 1885	01:26:09	First quarter	04°17'28	375892.94 km
January 30, 1885	16:19:10	Full Moon (Perigee)	11°00'50	362859.31 km

OSS. MICROSISM. 1885 Febbrajo Decade III.	21	22	23	24	25	26	27	28	Media	N. d'Os.	Media mensile	N. d'Oss.
Spinea di Mestre	0. 41	1. 33	0. 71	0. 71	0. 61	0. 00	0. 51	0. 00	0. 53	32		
Venezia	1. 44	4. 59	0. 90	0. 64	0. 64	0. 96	0. 74	0. 74	1. 33	40		
Verona	0. 19	0. 97	0. 43	0. 40	0. 48	0. 48	0. 34	3. 03	0. 79	45		
Piacenza	0. 97	1. 03	1. 08	0. 92	1. 59	0. 92	1. 19	1. 28	1. 12	24		
Moncalieri	1. 53	1. 71	0. 94	1. 79	1. 39	2. 41	1. 48	1. 55	1. 60	96		
Alessandria	0. 93	0. 72	0. 43	0. 36	1. 15	0. 77	0. 45	0. 65	0. 68	40		
Parma	0. 81	0. 86	0. 53	0. 37	0. 29	0. 29	0. 33	0. 41	0. 48	41		
Bologna-S. Luca	0. 33	1. 01	0. 92	0. 50	1. 26	0. 67	0. 00	0. 22	0. 61	29		
Chiavari	0. 59	0. 37	0. 62	0. 04	0. 04	2. 76	0. 00	0. 19	0. 57	46		
S. Gio: in Galilea	0. 77	0. 60	0. 47	0. 53	0. 57	0. 75	0. 28	0. 23	0. 42	51		
Pesaro	0. 56	1. 12	0. 42	0. 28	0. 42	0. 42	0. 14	0. 00	0. 42	48		
Firenze t. a.	1. 43	1. 19	0. 54	0. 35	0. 89	4. 66	0. 07	0. 27	1. 17	64		
Firenze t. n.	1. 13	1. 28	0. 61	0. 65	0. 96	8. 25	0. 30	0. 61	1. 09	64		
Livorno	—	—	—	—	—	—	—	—	—	—		
Fermo	0. 00	0. 00	0. 00	0. 00	0. 00	0. 00	0. 00	0. 38	0. 04	16		
Perugia	0. 59	1. 33	0. 89	1. 64	0. 89	1. 04	0. 59	0. 59	0. 87	32		
M. Fortino	5. 01	0. 95	2. 87	0. 00	2. 52	0. 00	0. 00	2. 14	1. 69	20		
Spoleto	—	—	—	—	—	—	—	—	—	—		
Narni	0. 64	0. 99	3. 18	0. 69	1. 83	1. 14	2. 33	1. 14	1. 32	24		
Viterbo	0. 39	0. 53	0. 17	0. 00	0. 00	0. 66	0. 00	0. 00	0. 21	29		
Aquila	1. 09	1. 43	0. 59	1. 36	1. 57	0. 41	0. 61	0. 48	0. 94	40		
Roma	0. 66	0. 89	0. 37	0. 35	0. 44	1. 16	0. 43	0. 28	0. 54	44		
Rocca di Papa	2. 28	1. 96	1. 51	1. 99	1. 68	1. 32	1. 44	1. 47	1. 70	50		
Velletri	0. 55	0. 76	0. 93	0. 59	0. 36	0. 43	0. 33	0. 37	0. 54	266		
Ceccano	—	0. 00	0. 00	0. 29	0. 00	0. 00	0. 00	0. 29	0. 82	19		
Foggia	0. 86	1. 12	1. 25	1. 50	1. 12	1. 16	0. 34	0. 17	0. 94	32		
Pozzuoli	0. 30	0. 60	0. 76	1. 06	0. 60	0. 60	1. 21	5. 47	1. 32	32		
Lecce	—	—	—	—	—	—	—	—	—	—		
Corleone	1. 45	0. 96	0. 72	1. 45	1. 93	1. 45	1. 93	0. 96	1. 35	23		
Acireale	—	—	—	—	—	—	—	—	—	—		
Catania	0. 69	1. 13	0. 92	0. 78	0. 88	0. 68	0. 99	0. 99	0. 87	41		
Med. microsism.	0. 98	1. 08	0. 84	0. 69	0. 89	1. 05	0. 59	0. 88	0. 88	1288		
Numero di scosse	6	2	1	2	2	4		10	Tot. delle sc.	31		
Intens. massima	3°	2°	2°	2°	1°	6°	3°	3°				

rona. Così i due massimi sismici di questa decade conservaronsi alla medesima distanza periodica dei precedenti corrispondendo quello del 21 all'anteriore del 10, e quello del 26 all'altro del 16.

M. S. DE ROSSI

February 21-26, 1885 (seismic maximum)

1885-02-26	20:48	Pianura Padana	Mw = 5.01

February 21, 1885 Jupiter opposition

March 1, 1885 04:00:14 Full Moon 10°46'29 372102.89 km

OSS. MICROSISM. 1885 Decembre Decade III.	21	22	23	24	25	26	27	28	29	30	31	Media	N.d'Os.	Media mensile	N. d'Os.
Spinea di Mestre	0. 00	0. 20	0. 00	2. 06	1. 14	0. 56	1. 85	0. 30	0. 10	2. 79	2. 29	1. 02	44		
Venezia	0. 26	0. 00	0. 21	1. 06	0. 53	1. 06	0. 53	0. 53	0. 53	2. 40	0. 26	0. 67	66		
Verona	—	—	—	—	—	—	—	—	—	—	—	—	—		
Piacenza	1. 34	1. 28	0. 81	0. 61	1. 12	0. 72	0. 88	1. 62	1. 59	0. 97	0. 81	1. 05	82		
Moncalieri	0. 54	1. 47	1. 41	2. 31	1. 67	1. 77	2. 62	2. 15	2. 01	2. 68	1. 98	1. 87	125		
Alessandria	0. 46	1. 10	0. 70	1. 44	0. 78	0. 62	1. 85	0. 70	0. 76	1 34	1. 23	0. 94	61		
Parma	0. 45	2. 16	0. 66	3 21	3. 06	0. 62	2. 36	0. 58	2. 12	3. 63	2. 92	1. 98	55		
Bologna - S. Luca	0. 00	0 99	0. 16	1. 01	1. 53	0. 84	1. 51	0. 94	0. 00	2. 03	0. 78	0. 89	46		
Chiavari	—	—	—	—	—	—	—	—	—	—	—	—	—		
S. Gio: in Galilea	0. 06	0. 12	0. 12	0. 62	1. 14	0. 42	0. 55	0. 23	0. 08	1. 48	1. 02	0. 53	66		
Pesaro	0. 30	0. 15	0. 00	1. 07	1. 99	0. 76	2. 60	1. 07	0. 00	3. 67	3. 37	1. 36	66		
Firenze t. n	3. 45	3. 34	3. 34	3. 45	3. 34	0. 89	2. 63	0. 20	1. 26	4. 40	3. 50	2. 66	74		
Firenze t. a	1. 03	3. 14	3. 14	1. 03	3. 14	1. 52	0. 81	0. 51	1. 68	2. 90	2. 70	1. 96	74		
Livorno	—	—	—	—	—	—	—	—	—	—	—	—	—		
Fermo	0. 00	0. 00	0. 00	0. 00	6. 65	0. 96	0. 00	0. 00	0. 00	0. 00	4. 95	1. 14	21		
Perugia	0. 59	0. 89	0. 59	0. 59	1. 63	0. 59	1. 48	0. 89	0. 74	2. 67	5. 20	1. 44	44		
M. Fortino	—	0. 00	0. 00	0. 00	1. 43	0. 52	0. 95	0. 47	0. 00	2. 87	1. 91	0. 81	26		
Spoleto	0. 00	0. 00	0. 00	0. 00	2. 42	1. 81	0. 00	2. 42	0. 00	1. 81	2. 42	0. 98	19		
Narni	0 49	0. 34	0. 00	0. 00	0. 99	0. 99	1. 49	1. 49	0. 00	0. 49	1. 74	0. 73	33		
Viterbo	0. 00	1. 05	0. 00	1. 32	1. 05	0. 35	1. 10	0. 53	0 35	0 53	1. 85	0. 74	31		
Aquila	0. 19	0. 46	0. 54	0. 56	4. 04	0. 73	1. 96	1. 57	0. 80	3. 02	3. 00	1. 53	53		
Roma	0. 53	1. 71	0. 88	2. 52	3. 09	0. 93	2. 71	1. 53	1. 26	2. 75	4. 23	2. 01	106		
Rocca di Papa	0. 00	0. 84	0. 84	1. 30	3. 17	0. 84	0. 98	1. 78	0. 92	1. 91	3. 49	1. 46	107		
Velletri	0. 17	1. 22	0. 70	1. 45	2. 38	1. 01	2. 04	1. 15	1. 65	2. 73	3. 83	1. 67	366		
Ceccano	—	—	—	—	—	—	—	—	—	—	—	—	—		
Foggia	0. 21	0. 56	0. 00	0. 00	1. 25	1. 29	1. 71	2. 49	0. 90	1. 58	3. 46	1. 22	44		
Benevento	0. 11	0. 13	0. 22	0. 22	0. 89	0. 56	1. 17	0. 61	0. 55	1. 08	1. 67	0. 65	33		
Pozzuoli	0. 60	0. 60	1. 21	0. 60	6. 08	3. 65	5. 48	6. 69	3. 65	7. 61	7. 30	3. 95	44		
Lecce	0. 40	0. 00	0. 00	0. 00	0. 35	2. 61	3. 22	1. 91	2. 82	2. 51	3. 62	1. 58	33		
Corleone	1. 93	1. 45	1. 69	1. 45	1. 69	1. 21	0. 72	1. 45	1. 93	1. 69	2. 66	1. 62	33		
Acireale	0. 86	0. 15	0. 10	0. 08	1. 32	0. 54	0. 36	1. 02	0. 71	0. 56	1. 08	0. 57	44		
Catania	0. 56	0. 82	0. 32	0. 36	5. 71	1. 52	1. 27	1. 49	1. 28	1. 20	6. 29	1. 89	74		
Med. microsism.	0. 52	0. 86	0. 63	1. 01	2. 26	1. 04	1. 58	1. 29	0. 98	2. 26	2. 84	1. 39	1820		
Numero di scosse	1	1	2	7	3	6	3	2	4	6	10	Totale sc.	45		
Intens. massima.	1	1	1	6	2	9	1	1	7	1	3				

Decade III.ª L'attività microsismica in questa decade tende ad un relativo riposo, manifestando minori i suoi massimi sempre però nella 2ª metà del periodo e col favore barometrico nei soli giorni di maggiore movimento cioè nel 25, 30 e 31. I terremoti furono molti di numero e di forza continuatamente dal 24 al 31 specialmente nel 24, 26, 29, 31. Fu la Basilicata nel 24 e 26 che sopportò gli urti maggiori; la Toscana nel 25; il Veneto nel 29; l'Umbria, il Lazio, e Benevento nel 30 e 31.

24-25 30-31 December (seismic maximum)

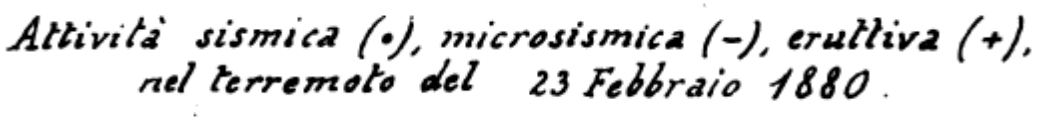
1885-12-24	10:50	Basilicata
1885-12-25	22:45	
1885-12-26	02	Molise
1885-12-26	03	La Gretagna (Basilicata)
1885-12-29		Alpago Cansiglio (Veneto)

December 21, 1885 20:58:34 Full Moon 00°14'03 360297.18 km

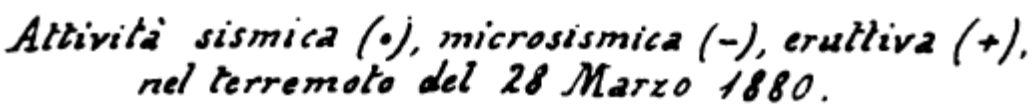
(Perigee)

January 5, 1886 07:43:45 New Moon 14°57'35 404999.84 km

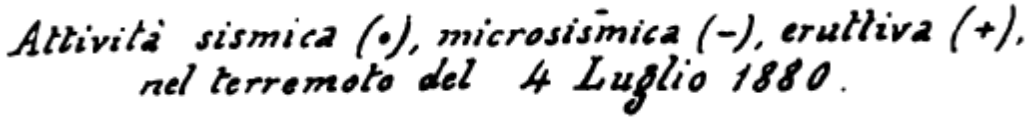
Some seismic events in the years 1880-1881

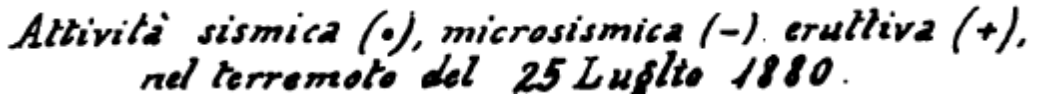


26 February 1880 01:21:57 Full Moon 06°52'03 380821.68 km



March 26, 1880 13:23:38 Full Moon 06°16'43 370160.23 km

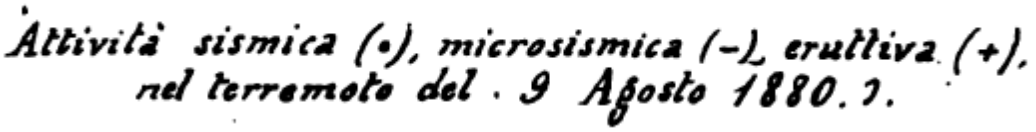




07/07/1880	14.10	Eclisse anulare.	Meridionale	4.42	19.47

July 7, 1880 13:21:29 New Moon 15°43'26 404175.72 km

July 21, 1880 21:02:26 Full Moon 29°23'06 361641.58 km



6 August 1880 03:48:30 New Moon 14°00'11 397385.59 km

Decade III.	21	22	23	24	25	26	27	28	29	30		Media	N.d'Os.
Bologna	1.37	2.12	2.30	0.48	0.69	1.88	1.87	1.36	1.06	0.69		1.33	66
Rimini	0.00	0.42	0.00	o. oo	0.00	1.13	2.12	3.25	1.13	0.00		0.80	20
Firenze t. a	2.33	2.98	1.87	0.34	0.53	0.81	1.46	1.36	0.22	0.30		1.22	110
Firenze t. n	1.41	2.68	1.56	0.59	0.54	1.52	3.30	1.48	0.70	0.54		1.41	110
Livorno	3.85	6.50	6.74	1.92	0.72	4.33	3.85	0.96	1.44	0.48		3.07	19
Fermo	0.34	0.49	0.94	0 31	0.25	0.30	3.03	3.08	1.63	1.15		1.15	31
M. Fortino	0.00	0.61	0.48	0.00	0.48	0.71	0.92	1.43	0.42	0.00		0.50	26
Narni	4 82	4.08	1.26	0.05	0.00	0.25	0.56	0.00	0.74	0.54		1.23	36
Viterbo	0.53	0.66	0.35	1.05	1.05	1.05	1.98	0.52	0.66	0.52		0.83	34
Roma	0.85	1.43	1.46	0.88	0.45	0.80	1.82	2.46	1.55	0.98		1.26	94
Rocca di Papa	0.00	1.68	0.00	0.00	3.37	—	0.00	--	0.00	0.00		0.63	20
Velletri	1.38	2.12	1.76	1.05	0.43	1.19	2.27	1.74	3.01	2.20		1.72	294
Ceccano	0.00	0.00	0.00	0.00	0.00	0.00	1.46	5.27	0.00	0.00		0.67	35
Foggia	1.71	2.14	2.40	0.81	0.21	0.77	0.47	2.06	2.44	2.74		1.57	40
Corleone	1.63	0.90	2.35	1.63	1.44	1.44	1.69	0.72	0.48	1.44		1.37	38
Med. gen. diurna	1.34	1.92	1.56	0.60	0.67	1.15	1.78	1.83	1.03	0.77		1.26	973
1881 MAGGIO Decade I.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			
Bologna	1.24	0 85	1.30	1.18	2.07	1.59	0.91	0.43	1.77	1.99		1.33	69
Rimini	0.00	0.00	0.00	0.00	o. oo	o. oo	o. oo	1.98	2 97	1.98		0.69	20
Firenze t. a	0.10	1.32	2.84	0.91	0.22	0.10	0.10	0.22	0.12	0.41		0.63	99
Firenze t n	0.54	1.39	2.11	1.19	0.87	0.65	0.45	0.13	0.80	2.00		1.00	99
Livorno	1.44	4.62	4.33	3.37	1.44	0 72	0.48	0.00	0.48	7.23		2.41	19
Fermo	0.18	0.42	0.87	0.73	0.56	1.00	0.57	0.23	0.21	1.92		0.66	25
M. Fortino	o.oo	0.95	1.52	0.47	1.07	0.00	0.95	0.00	0.00	1.67		0.66	25
Narni	0.54	3.46	1.11	0.29	1.35	1.04	0.22	0.45	0.64	1.12		1.02	33
Viterbo	0.00	0.70	1.05	—	1.26	1.45	0.35	0.74	0.00	0.95		0.72	29
Roma	0.16	0.57	1.58	1.08	0.24	0.28	0.58	0.28	0.22	1.82		0.67	88
Rocca di Papa	3.37	3.22	1.26	0.00	0.00	0.00	3.53	0.42	0.00	0.00		1.18	32
Velletri	0.45	1.05	1.20	1.39	0.58	0.47	0.45	0.32	0.33	2.36		0.86	323
Ceccano	0.00	—	1.09	0.87	0.43	—	0.43	0.00	0.00	0.87		0.46	18
Foggia	0.17	1.25	1.12	1.07	0.47	0.17	1.88	0.81	1.37	2.01		1.03	40
Corleone	1.63	1.08	1.81	0.36	1.27	0.18	1.63	1.81	1 63	1.81		1.32	40
Med. gen. diurna	0.65	1.49	1.54	0.92	1.78	0.54	0.83	0.52	0.70	1.87		1.08	959
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**			
Bologna	0.92	0 75	0.37	0.95	2.00	0.55	0.87	0.69	0.58	0.31		0.79	63
Rimini	o. oo	0.00	0 00	o. oo	1.69	0.56	0.00	0.00	o. oo	o. oo		0.22	20
Firenze t. a	0.30	0 34	0.22	0.06	0.16	0.06	0.49	0.12	0.00	0.12		0.18	98
Firenze t. n	0.83	0.33	0.54	0 54	0.43	0.24	1.74	0.54	0.00	0.17		0 52	98
Livorno	0.72	1.20	0 96	2.41	0.60	0.24	2.65	0.48	0.24	0.24		0.97	20
Fermo	0.89	0.13	0.25	o. 38	0.26	0.03	0.17	0.76	0.07	0.05		0.30	20
M. Fortino	2.95	0.71	0.00	0.95	0.00	5.30	0.00	0.01	0 35	0.71		1.10	24
Narni	0.79	0.39	2.13	2.28	0.52	1.63	1.59	1.24	0.00	0.09		1.06	28
Viterbo	0.26	0.66	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00		0.12	33
Roma	1.20	0.40	0.45	0.50	0 40	0.14	0.31	0.40	0.16	0.40		0.43	77
Rocca di Papa	0.00	3.79	1.68	o. oo	0.00	2.80	0.42	—	—	—		1.24	25
Velletri	1.50	0.35	1.24	1.21	0.78	0.53	0.48	0.79	0.63	0.54		0.80	329
Ceccano	1.31	0.00	0.00	3.51	0.00	0.00	0.00	3.51	0.00	0.00		0.83	21
Foggia	0.17	0.91	0.81	1.07	0.94	0.17	0.29	1.84	3.21	1.12		0.98	40
Corleone	0.72	0.90	1.63	1.16	0.90	0.90	1.81	2.17	1.27	0.72		1.21	40
Med. gen. diurna	0.83	0.67	0.68	1.00	0.57	0.87	0.74	0.89	0.46	0.32		0.71	936
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**		
Bologna	0.37	0.31	1.06	0.69	0.37	0.37	0.75	0.37	0.69	0.87	0.75	0.60	67
Rimini	0.00	0.00	0. oo	0. oo	0. oo	0. oo	0. oo	0.00	0.00	0.00	0.00	0.00	22
Firenze t. a	0.12	0.20	0.12	0.36	0.08	0.04	0.12	0.20	0.18	0.16	0.06	0.14	105
Firenze t. n	0.04	0.20	0.43	0.33	0.22	0.29	0.65	0.61	0.47	0.39	0.17	0.33	105
Livorno	0 12	0.48	0.36	1.08	0.48	0.24	1.80	1.03	0.96	0.79	0.96	0.75	21
Fermo	0.01	0.05	0.57	—	0.07	0.11	0.30	0.19	0.46	0.15	0.19	0.21	14
M. Fortino	1.19	1.43	4.58	0.51	2.86	1.48	0.71	0.95	1.43	0.71	0.00	1.44	27

April 23, 1881 6.74 (Microseismic maximum)

1881-04-23	04:12	Paola

28 April 1881 10:24:45 New Moon 08°14'36 386678.20 km

Narni	0.14	0.29	2.98	0.79	0.39	1.04	1.59	0.09	0.00	2.23	0.54	0.91	29
Viterbo	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	32
Roma	0.50	0.25	0.08	0.37	0.30	0.58	0.65	0.47	0.54	0.47	0.37	0.41	84
Rocca di Papa	0.00	2.80	0.84	0.84	3.03	0.00	0.00	0.00	0.84	0.00	0.00	0.76	30
Velletri	0.59	0.29	0.34	0.51	0.45	0.11	0.89	0.61	0.72	0.42	0.42	0.49	355
Ceccano	0.00	0.58	0.58	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.50	0.16	61
Foggia	0.17	0.86	1.29	0.43	0.00	0.34	0.81	0.51	0.17	0.43	0.90	0.55	44
Corleone	0.72	1.63	1.63	1.27	1.81	1.99	1.08	0.72	1.27	1.08	1.99	1.38	44
Med. gen. diurna	0.28	0.62	0.98	0.51	0.67	0.43	0.62	0.39	0.51	0.51	0.45	0.59	1040
1881 GIUGNO Decade I.	1	2	3	4	5	6	7	8	9	10		Media	N.°Os
Bologna	0.37	0.61	0.37	1.18	0.84	2.19	1.92	2.10	1.73	0.75		1.20	62
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.04	0.02	0.06	0.16	0.04	0.32	2.47	2.84	1.52	0.59		0.79	107
Firenze t. n.	0.02	0.20	0.15	0.89	0.31	1.41	2.54	3.29	1.72	0.89		1.09	107
Livorno	0.24	0.36	0.48	0.00	0.84	2.23	7.95	5.06	2.41	0.96		2.05	19
Fermo	0.00	0.00	0.00	0.19	0.07	1.08	0.77	1.02	0.65	0.53		0.43	18
M. Fortino	3.82	2.39	5.31	4.29	3.82	4.29	3.82	10.77	0.00	0.00		3.85	25
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.70	0.88	2.11	0.88	0.53		0.51	28
Roma	0.38	0.41	0.36	0.45	0.20	0.50	1.67	2.06	1.34	0.87		0.82	88
Rocca di Papa	2.24	0.30	0.42	2.73	1.96	0.42	—	3.08	1.54	1.68		1.56	33
Velletri	0.32	0.28	0.35	0.51	0.34	1.82	2.54	2.57	1.02	0.54		1.03	333
Ceccano	0.00	0.00	0.21	0.00	0.58	1.23	2.05	2.41	3.95	0.00		1.04	48
Foggia	0.94	0.12	0.17	0.12	0.12	0.60	2.10	1.97	2.49	0.81		0.94	40
Corleone	0.36	0.72	1.08	1.81	0.36	1.27	1.27	1.44	1.81	0.54		1.06	40
Med. gen. diurna	0.67	0.39	0.68	0.91	0.72	1.39	2.49	3.13	1.62	0.66		1.26	950
Decade II.	11	12	13	14	15	16	17	18	19	20			
Bologna	0.61	1.06	0.81	0.87	0.75	0.55	0.69	0.55	0.54	0.37		0.68	68
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.45	0.83	0.06	0.18	0.06	0.02	0.00	0.06	0.10	0.26		0.20	88
Firenze t. n.	0.78	1.13	0.47	0.72	0.70	0.35	0.26	0.54	0.26	0.33		0.54	88
Livorno	1.44	3.85	1.08	5.06	1.68	0.72	0.96	0.24	0.12	0.36		1.55	18
Fermo	1.04	0.00	0.00	0.05	0.30	0.00	0.00	0.00	0.00	0.00		0.13	12
M. Fortino	—	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71		0.08	21
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	28
Roma	0.69	0.77	0.38	0.63	0.47	0.26	0.32	0.26	0.43	0.49		0.47	84
Rocca di Papa	1.68	1.68	0.00	1.68	0.84	4.21	0.00	0.00	0.00	2.10		1.21	25
Velletri	1.25	1.02	0.78	0.89	0.37	0.61	0.16	0.37	0.45	0.30		0.62	323
Ceccano	1.46	—	0.00	0.00	—	—	0.00	0.00	0.00	0.00		0.21	13
Foggia	0.90	0.12	0.21	1.54	0.12	1.54	0.25	0.04	0.17	0.00		0.36	40
Corleone	0.90	0.90	1.63	1.81	2.53	1.99	1.81	1.81	1.27	1.81		1.64	40
Med. gen. diurna	0.93	0.94	0.41	1.03	0.65	0.85	0.34	0.29	0.25	0.51		0.62	843
Decade III.	21	22	23	24	25	26	27	28	29	30			
Bologna	1.03	1.45	0.37	0.43	0.49	0.63	1.18	0.49	0.91	1.18		0.81	65
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.08	0.16	0.16	0.12	0.24	0.06	0.30	0.08	0.26	0.57		0.20	102
Firenze t. n.	0.54	0.83	0.26	0.02	0.09	0.09	0.67	0.43	1.13	0.87		0.47	102
Livorno	0.72	1.92	0.72	0.12	0.24	0.12	1.44	0.31	1.32	0.96		0.78	19
Fermo	0.00	0.00	0.11	0.13	0.03	0.02	0.24	0.31	0.16	1.29		0.22	28
M. Fortino	0.00	0.00	0.00	0.14	—	0.00	1.43	0.14	0.00	0.14		0.20	16
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	21
Roma	0.33	0.68	0.56	0.54	0.52	0.34	0.82	0.61	0.30	1.64		0.63	63
Rocca di Papa	—	—	—	—	0.00	3.37	4.21	0.00	1.34	2.16		1.84	22
Velletri	0.42	0.30	0.17	0.24	0.32	0.34	0.63	0.60	0.51	1.91		0.54	335
Ceccano	0.00	0.00	—	—	0.35	0.00	0.00	0.00	0.00	0.00		0.04	15
Foggia	0.12	0.08	0.25	1.12	0.00	0.21	0.43	0.34	0.69	2.70		0.59	40
Corleone	0.90	1.08	1.81	1.08	1.81	1.44	1.08	1.81	1.81	0.54		1.38	40
Med. gen. diurna	0.34	0.54	0.40	0.85	0.34	0.50	0.95	0.39	0.64	1.07		0.58	868

9-14-18 June 1881 → 7 June 7.95 14 June 5.06 16 June 4.21 (microseismic maximums)

1881-06-09	Basso Vallese
1881-06-14 01:30	Interlaken
1881-06-18 02:50	Carnia

June 12, 1881 06:56:47 Full Moon 21°23'25 362063.98 km

June 18, 1881 21:18:37 Last quarter 27°41'17 376431.65 km

1881 LUGLIO Decade I.	1	2	3	4	5	6	7	8	9	10		Media	N.d'Os.
Bologna	0.37	0.48	0.37	0 31	0.27	0.4:	0 63	0.92	0.63	1.06		0.54	63
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.28	0.2?	0.14	0.26	0.12	0.14	0.14	0.26	2.25	1.32		0.53	89
Firenze t. a.	0.35	0.29	0.20	0.13	0.20	0.13	1.15	1.52	0.76	1.26		0.61	89
Livorno	0.48	0.13	0.35	0.35	0.00	0.12	3.85	3.76	4.04	1.68		1.47	20
Fermo	0.40	0.40	0.06	0.48	0.00	0.00	0.00	0.05	0.10	0.00		0.15	25
M. Fortino	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	18
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00		0.02	25
Roma	1.44	0.30	0 25	0.28	0.41	0.41	0.41	1.13	0.41	0.51		0.55	42
Rocca di Papa	2.88	1.96	1.85	0.95	1.05	0.56	1.32	1.80	0 28	1.26		1.39	56
Velletri	1.81	0.66	0.42	0.40	0.38	0.30	0.38	0.41	0.51	0.64		0.59	309
Ceccano	0.00	0.00	0.00	0.00	—	0.00	—	—	0.00	--		0.00	10
Foggia	2.74	1.93	0.21	2.01	1.07	0.00	0.56	1.49	1.93	0.00		1.20	40
Corleone	0.90	0.72	0.72	1.08	0.90	1.68	1.27	1.44	1.08	1 81		1.08	40
Med. gen. diurna	0 89	0.54	0.35	0.48	0.38	0.28	0.80	1.06	0.92	0.73		0.64	826
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**			
Bologna	0 31	0.75	0.25	0.37	0.37	0.31	0. 81	0.63	1.00	0 87		0.56	60
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a	0.14	0.61	0.04	1.01	0.08	0.14	0.18	0.14	0.12	0.16		0.26	95
Firenze t. n.	0.54	0.04	0.35	0.59	0.17	0.15	0.67	0.31	0.33	0.17		0.33	95
Livorno	1.92	0.24	0.14	0.21	0.24	0.48	1.20	0.48	0.31	0.35		0.56	20
Fermo	1.19	0.76	0.03	0.26	0.00	0.02	0.07	0.09	0.03	0.00		0.24	26
M. Fortino	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	21
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00		0.02	27
Roma	0.53	0.51	0.27	0.41	0.47	0.20	0.10	0.06	0.20	0.32		0.30	32
Rocca di Papa	0.98	1.85	1.68	1.68	0.84	0.00	1.47	—	0.00	2.24		1.19	35
Velletri	0.64	0.68	0.44	0.29	0.48	0.33	0.60	0.43	0.45	0.50		0.48	308
Ceccano	1.76	—	—	—	—	—	0.58	0.00	—	6.16		2 12	13
Foggia	1.29	1.58	1.25	0.90	0.81	0.56	0.38	1.66	0.73	0.43		0.98	40
Corleone	1.08	0.90	—	—	—	—	—	—	—	1.08		1.03	12
Med. gen. diurna	0.79	0.66	0.40	0.52	0.31	0.19	0. 0	0.36	0.28	0.94		0.62	784
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**		
Bologna	1.18	1.27	0.75	0.43	0.81	0.37	2.07	1.55	0 81	1.06	0.63	0.99	67
Rimini	—	—	—	—	—	—	—	—	—	—	—	—	—
Firenze t. a	0.34	1.74	1.28	0.26	0.34	0.41	1.26	1 34	0 41	0.61	0.55	0.77	103
Firenze t. n.	0.65	1.37	1.02	0.47	0.45	0.78	1.28	1.13	0.51	0.41	0.43	0.76	103
Livorno	0.96	6.74	2.16	0.31	0.31	0.79	6.74	2.41	0.60	0.31	0.21	1.96	21
Fermo	0.00	0.22	0.32	0.51	0.02	0.26	1.58	1.83	1.08	0.65	0.05	0.59	34
M. Fortino	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26
Narni	—	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	0.00	0.52	0.17	0.17	0.00	0.35	2.11	0.70	0.00	0.00	0.00	0.36	30
Roma	0.27	0.54	0.61	0.82	0.54	0.61	2.10	0.89	3.43	0.46	0.51	0.98	40
Rocca di Papa	3.70	1.05	0.84	3.87	0.56	0.84	2.52	—	0.00	0.28	0.00	1.31	31
Velletri	0.47	0.58	1.09	1.01	0.52	0.58	1.61	1.55	3 11	0.70	0.29	1.05	362
Ceccano	0.87	0.00	0.58	0.00	0.00	0.00	0.43	1.88	2.13	0.17	0.00	0.55	53
Foggia	0.17	1.88	1.07	1.75	1.49	0.17	2.66	2 62	2.23	0.86	0.00	1.35	44
Corleone	0.72	0.90	0.36	0.9	1.27	1.08	0.9	0.90	1.81	1.63	0.54	1.00	44
Med. gen. diurna	0.71	1.29	0.79	0.77	0.48	0.48	1.94	1.40	1.24	0.55	0.25	0.99	958
1881 AGOSTO Decade I.	1	2	3	4	5	6	7	8	9	10			
Bologna	0.31	0.43	0.92	1.06	1.00	0.69	0.69	0.45	0.69	1.61		0.78	59
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	20
Firenze t. a.	0.21	0.14	0.10	0.51	0.16	0.59	1.32	0.43	0.20	2.01		0.57	105
Firenze t. n.	0.26	0 39	0.39	0.29	0.47	0.33	0.63	0.70	0.39	2.17		0.59	105
Livorno	0.77	0.09	1.44	0.48	0.21	0.12	0.24	0.07	0.14	1.92		0.55	19
Fermo	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0.00	0.00		0.00	35
M. Fortino	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.96	0.00	0 00		0.10	26
Narni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.49	1.62		0.61	30

18-22 July → 20 July 6.16 (microseismic maximum)

1881-07-18	19:30	Fango
1881-07-22		Belledonne-Pelvoux
1881-07-22	02	Genevois (Chaine des Aravis ?)
1881-07-22	02:45	Belledonne-Pelvoux

18 Jul 1881	05:33:40	Last quarter	25°40'18	382853.95 km
26 Jul 1881	05:19:21	New Moon	03°18'15	406581.25 km

Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	—	—	—	—		0.00	17
Roma	0.30	0.28	0.16	0.28	0.21	0.25	0.41	0.69	0.30	0.50		0.33	41
Rocca di Papa	0.00	0.33	1.51	0.00	0.00	0.84	1.96	2.91	0.84	2.52		1.09	34
Velletri	0.42	0.50	0.62	0.46	0.42	0.35	0.80	0.66	0.51	0.87		0.56	339
Ceccano	0.00	0.00	3.28	0.00	0.00	0.00	0.00	—	—	—		0.46	43
Foggia	0.17	0.00	0.69	2.74	1.66	0.69	1.12	0.69	0.25	0.51		0.85	40
Corleone	0.90	1.27	0.72	0.54	0.90	0.36	1.27	1.45	1.45	1.27		1.01	40
Med. gen. diurna	0.23	0.23	0.70	0.42	0.33	0.28	0.60	0.79	0.48	1.38		0.54	958
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**		**Media**	**N.d'Os.**
Bologna	2.45	0.92	0.55	1.61	3.36	0.55	1.18	1.53	1.00	0.75		1.39	65
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	20
Firenze t. a	1.05	0.57	0.21	2.23	1.64	0.83	2.70	2.23	0.65	0.24		1.23	101
Firenze t. n	1.19	0.65	0.76	2.15	2.00	0.91	1.09	2.06	0.80	0.43		1.19	101
Livorno	4.57	1.68	4.09	2.89	1.20	1.44	2.89	5.30	2.89	0.12		2.70	19
Fermo	0.00	0.00	0.00	0.00	0.00	0.06	—	0.57	0.82	0.52		0.22	27
M. Fortino	0.00	0.00	0.71	0.00	1.91	0.00	0.47	3.34	0.00	0.00		0.64	28
Narni	2.72	0.14	0.00	1.49	0.39	0.07	1.63	5.97	0.00	0.81		1.32	21
Viterbo	—	—	—	1.05	1.93	0.00	0.00	—	0.00	—		0.59	10
Roma	0.71	0.00	0.10	0.00	1.03	0.40	0.00	1.16	0.61	0.07		0.40	28
Rocca di Papa	2.24	0.56	1.68	2.52	2.52	2.38	1.68	3.37	0.00	0.00		1.69	32
Velletri	1.02	0.40	0.42	1.20	2.55	1.11	1.68	1.65	0.81	0.41		1.13	339
Ceccano	—	—	—	—	—	—	—	—	0.00	0.12		0.06	10
Foggia	0.98	0.64	0.50	0.43	5.82	3.03	1.88	3.59	0.69	0.69		1.83	40
Corleone	0.90	0.72	1.81	1.27	1.08	0.36	0.72	1.45	1.45	1.63		1.13	40
Med. gen. diurna	1.37	0.48	0.84	1.20	1.81	0.79	1.22	2.47	0.64	0.41		1.12	881
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**		
Bologna	0.68	0.55	0.94	0.51	1.49	1.49	0.87	1.65	1.57	0.82	0.49	1.00	70
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.26	0.00	0.00	0.29	22
Firenze t. a	0.12	0.30	0.14	0.20	0.71	0.13	0.63	1.42	0.69	0.26	0.04	0.42	95
Firenze t. n	0.65	1.09	1.09	1.17	0.87	0.61	0.22	1.56	1.19	0.87	0.85	0.92	95
Livorno	0.48	0.60	1.44	3.61	0.72	0.53	0.14	6.02	2.89	0.48	0.48	1.58	21
Fermo	0.00	0.05	0.43	0.34	0.28	0.20	0.23	0.09	0.00	1.15	0.51	0.29	28
M. Fortino	0.00	2.58	0.00	2.39	1.91	0.00	0.00	5.30	0.00	0.00	0.00	1.10	30
Narni	0.00	3.80	0.00	0.07	0.81	0.00	0.07	0.81	1.49	0.05	0.00	0.64	23
Viterbo	—	—	—	—	—	—	—	1.05	0.17	0.52	0.00	0.43	12
Roma	0.20	0.54	0.68	0.54	0.40	0.56	0.24	0.51	0.71	0.82	0.05	0.47	34
Rocca di Papa	1.68	3.37	0.84	0.56	0.56	0.00	0.00	0.00	0.00	2.10	0.00	0.82	28
Velletri	0.33	0.64	0.74	0.55	0.54	0.91	0.44	3.70	1.24	1.47	0.36	0.99	39
Ceccano	0.17	0.14	0.70	0.10	0.12	0.00	0.00	0.35	0.44	0.00	0.00	0.18	56
Foggia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.97	1.75	2.49	0.00	0.56	44
Corleone	0.72	0.90	0.90	1.45	0.90	0.36	1.27	0.90	1.81	1.63	1.81	1.15	44
Med. gen. diurna	0.35	1.04	0.56	0.82	0.66	0.34	0.29	1.68	1.14	0.84	0.30	0.72	911
1881 SETTEMBRE Decade I.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			
Bologna	2.76	1.55	1.27	0.37	1.62	0.81	3.06	0.63	1.30	1.06		1.44	60
Rimini	0.00	0.00	4.95	1.41	0.00	0.00	0.00	0.00	0.00	1.55		0.79	20
Firenze t. a	0.00	0.18	0.14	0.14	0.22	0.57	0.45	0.53	1.07	2.98		0.63	83
Firenze t. n	1.09	1.02	0.78	0.59	0.70	0.59	2.21	0.22	0.54	0.80		0.85	83
Livorno	7.90	4.82	3.61	2.89	0.24	3.37	—	0.96	3.13	1.80		3.19	16
Fermo	0.13	1.65	0.92	0.38	0.78	0.57	0.98	0.53	0.16	1.19		0.72	23
M. Fortino	0.75	2.87	1.09	0.00	0.00	0.00	7.91	0.47	0.00	0.00		1.30	24
Narni	0.09	6.16	0.00	0.56	0.37	0.00	3.73	0.49	0.54	0.00		1.19	28
Viterbo	1.48	1.05	0.00	0.00	—	—	1.58	0.00	0.00	0.00		0.51	22
Roma	1.31	2.77	0.46	0.00	0.00	0.00	1.43	0.82	0.40	1.25		0.84	42
Rocca di Papa	4.98	1.68	1.68	1.12	0.00	3.37	0.84	0.84	0.56	0.42		1.54	34
Velletri	2.80	2.49	1.56	0.56	0.41	0.38	1.21	0.67	0.42	2.91		1.34	306
Ceccano	2.13	1.50	0.99	0.00	0.00	0.00	0.43	0.00	0.00	0.00		0.50	56
Foggia	1.93	4.28	1.75	0.69	0.51	1.84	2.06	0.51	0.00	1.03		1.46	40
Corleone	2.35	1.63	1.08	0.36	0.18	0.72	0.36	0.18	1.08	0.72		0.86	40
Med. gen. diurna	1.98	2.21	1.35	0.60	0.35	0.87	1.87	0.45	0.61	1.05		1.14	877

August 3, 1881 3.28 ; August 15, 5.82 ; August 28, 6.62

1881-08-03	14:42	Alessandrino
1881-08-05		Belledonne-Pelvoux

3 August 1881	04:42:49	First quarter	10°56'05 383	704.82 km
9 August 1881	21:07:07	Full Moon	17°20'25 357	400.90 km

Decade II.	11	12	13	14	15	16	17	18	19	20	Media	N.d'Os.
Bologna	1.12	1.13	1.12	0.49	0.25	0.84	1.06	0.92	1.49	0.43	0.88	60
Rimini	0.00	1.01	0.00	0.00	1.69	0.00	0.00	0.00	2.54	0.84	0.60	20
Firenze t. a.	0.16	0.71	0.47	0.36	0.04	0.49	0.30	0.36	0.30	0.20	0.32	99
Firenze t. n.	0.54	1.98	0.89	0.83	0.39	0.87	0.59	0.65	0.67	0.74	0.80	99
Livorno	0.84	3.13	2.89	0.96	0.14	1.68	0.48	0.48	0.07	0.24	1.09	20
Fermo	0.19	0.00	0.00	0.78	0.76	0.26	0.91	—	—	0.00	0.36	18
M. Fortino	0.71	0.00	1.43	0.00	0.00	0.47	0.71	0.00	0.00	0.00	0.33	23
Narni	1.49	0.00	0.00	0.00	0.09	0.14	0.61	0.00	0.00	0.05	0.24	26
Viterbo	1.32	0.26	0.00	0.00	0.00	0.00	0.53	0.00	0.00	0.17	0.22	27
Roma	1.64	0.61	0.30	0.00	0.35	0.20	0.86	0.82	0.00	0.00	0.17	26
Rocca di Papa	2.52	1.12	1.12	0.00	0.84	0.00	0.00	1.68	0.00	—	0.80	20
Velletri	1.59	0.93	0.56	0.60	0.62	0.55	1.39	2.00	0.40	0.60	0.92	220
Ceccano	0.73	0.00	0.00	0.00	0.00	0.78	0.21	0.65	0.00	0.00	0.23	50
Foggia	0.90	1.93	0.98	0.29	1.49	2.14	3.34	1.20	0.34	0.64	1.33	40
Corleone	0.99	1.27	1.81	0.72	0.72	0.54	0.90	0.18	0.90	1.63	1.06	40
Med. gen. diurna	1.04	0.93	0.77	0.33	0.49	0.59	0.79	0.59	0.44	0.36	0.64	788
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**		
Bologna	1.24	1.24	3.16	2.99	3.16	1.12	1.76	1.97	2.85	4.48	2.39	62
Rimini	0.00	0.00	0.00	0.00	3.96	3.25	3.67	2.12	1.98	2.54	1.75	20
Firenze t. a.	0.24	2.98	2.80	0.36	0.75	0.47	0.32	2.07	0.28	2.15	1.24	114
Firenze t. n.	0.78	2.54	1.52	1.09	1.15	0.93	0.74	3.55	1.09	2.04	1.54	114
Livorno	0.72	7.71	5.51	1.44	1.34	0.24	0.48	6.26	0.24	2.41	2.10	20
Fermo	0.00	0.15	0.61	0.59	0.76	0.59	1.28	0.05	0.98	0.84	0.55	21
M. Fortino	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.35	—	—	0.16	17
Narni	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	0.35	1.23	1.23	0.70	1.05	1.23	0.88	0.00	1.58	1.76	1.00	28
Roma	0.00	—	1.37	—	1.64	1.64	2.47	0.49	0.00	0.97	1.06	17
Rocca di Papa	0.84	—	2.21	0.00	—	0.42	3.37	0.00	2.02	2.52	1.42	24
Velletri	0.43	1.16	1.26	1.62	1.08	2.54	1.67	0.52	0.71	1.21	1.22	221
Ceccano	0.00	0.00	0.14	0.22	0.00	0.87	0.87	0.17	0.17	0.52	0.29	45
Foggia	0.00	1.97	2.53	2.62	4.06	4.15	0.69	3.71	1.84	3.03	2.46	40
Corleone	0.18	0.90	0.00	1.81	1.45	1.08	0.90	0.72	1.81	0.72	0.95	40
Med. gen. diurna	0.36	1.38	1.49	0.89	1.36	1.23	1.27	1.05	1.03	1.67	1.20	783
1881 OTTOBRE **Decade I.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
Bologna	5.00	4.43	2.29	2.30	1.87	3.29	1.98	2.67	1.24	1.49	2.65	65
Rimini	4.95	2.54	1.83	0.99	0.99	0.28	0.00	0.00	0.00	0.00	1.15	20
Firenze t. a.	1.00	0.81	0.38	0.61	0.61	0.61	1.26	1.70	1.36	1.11	1.00	110
Firenze t. n.	1.93	1.76	0.56	0.83	1.41	1.89	1.96	2.65	0.61	0.80	1.43	110
Livorno	0.48	0.96	0.48	1.44	0.72	4.82	3.43	7.23	2.16	0.38	2.20	20
Fermo	1.15	1.02	1.19	1.90	2.90	1.21	2.69	1.13	1.59	1.38	1.61	20
M. Fortino	—	—	—	—	—	—	—	—	—	—	—	—
Narni	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	2.82	0.39	0.00	0.00	1.19	1.05	1.58	0.79	1.32	0.17	0.93	31
Roma	—	0.41	0.20	0.41	0.88	0.61	0.51	1.02	1.64	0.76	0.71	21
Rocca di Papa	0.00	3.36	0.84	0.00	1.68	1.96	2.24	0.42	1.40	0.00	1.19	28
Velletri	1.38	0.70	0.45	0.43	1.47	0.94	2.22	0.83	1.07	0.76	1.02	315
Ceccano	0.00	0.00	0.00	0.00	0.70	0.00	0.65	0.00	0.00	0.00	0.13	40
Foggia	2.40	1.37	1.41	1.88	1.25	1.88	1.58	0.86	0.86	1.08	1.45	40
Corleone	0.54	1.27	0.90	0.54	0.54	1.45	0.36	0.72	0.36	0.54	0.72	40
Med. gen. diurna	1.85	1.46	0.81	0.87	1.24	1.53	1.57	1.54	1.04	0.64	1.25	860
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**		
Bologna	1.67	1.18	0.63	0.63	1.06	2.79	0.92	0.92	0.87	1.61	1.22	57
Rimini	0.00	0.00	0.00	0.00	0.99	1.69	1.83	0.00	0.00	0.00	0.45	20
Firenze t. a.	1.38	0.69	0.61	1.07	0.24	2.78	0.73	0.61	0.71	2.86	1.15	108
Firenze t. n.	1.52	0.98	0.78	1.28	1.52	1.76	1.02	0.91	1.90	4.35	1.61	108
Livorno	2.89	0.09	0.72	1.20	5.78	3.13	1.20	0.33	0.72	4.57	2.06	19
Fermo	2.25	1.17	1.79	1.00	0.21	1.79	1.71	0.07	0.00	0.31	1.03	20
M. Fortino	—	—	—	0.00	—	—	—	0.00	0.00	0.00	0.00	8
Narni	—	—	—	—	—	—	—	—	—	—	—	—

1 September 7.90 – 2 Sept. 6.16 – 7 Sept. 7.91 – 22 Sept. 7.71 – 23 Sept. 5.51 - 28 Sept. 6.26

1881-09-10 07	Chietino
1881-09-21 21:20	Tarentaise (Moutiers)
1881-09-28	Cesena

September 15, 1881	08:01:40	Last quarter	22°35'30	397730.55 km
September 23, 1881	11:54:48	New Moon	00°34'30	397300.47 km
September 30, 1881	21:48:28	First quarter	07°51'26	372356.18 km

Viterbo	0.00	0.00	0.00	0.79	1.41	0.00	0.26	0.17	0.35	1.32		0.43	25
Roma	0.92	1.06	0.51	0.41	1.02	1.44	1.13	—	0.51	2.06		1.01	26
Rocca di Papa	1.26	0.00	0.42	—	2.36	1.68	0.42	0.84	0.00	1.68		0.96	27
Velletri	0.89	1.30	0.64	0.85	1.05	2.96	1.58	0.79	0.29	1.69		1.20	317
Ceccano	0.00	0.00	0.58	0.00	0.00	0.00	0.43	0.52	0.43	0.00		0.19	33
Foggia	5.43	0.86	0.00	0.69	1.93	4.96	1.41	2.06	0.98	0.69		1.90	40
Corleone	1.63	0.54	1.27	1.27	0.72	1.27	0.90	0.36	1.08	1.08		1.01	40
Med. gen. diurna	1.52	0.60	0.61	0.70	1.40	2.01	1.04	0.58	0.56	1.58		1.06	848
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**Media**	**N.d'Os.**
Bologna	2.24	1.37	2.79	1.87	1.12	1.24	0.75	0.45	0.15	0.82	0.75	1.23	58
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22
Firenze t. a	6.04	2.23	1.03	1.11	2.03	0.51	0.47	0.43	0.71	1.76	1.32	1.60	112
Firenze t. n	2.79	2.00	0.22	1.48	1.35	0.74	1.68	0.87	1.02	0.89	1.76	1.33	112
Livorno	10.12	2.89	10.11	2.65	—	2.16	1.44	0.72	0.72	0.96	2.89	3.46	20
Fermo	0.92	1.34	1.25	0.90	0.90	0.84	0.86	0.98	0.55	1.42	1.15	1.01	23
M. Fortino	1.92	0.00	0.00	0.47	0.71	0.00	0.00	0.00	0.00	1.43	—	0.45	26
Narni	—	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	2.64	0.13	1.05	1.94	0.00	0.35	1.05	0.00	0.26	2.11	3.44	1.17	34
Roma	1.91	1.09	0.00	0.75	0.56	0.92	0.82	0.64	0.82	1.91	2.59	1.09	60
Rocca di Papa	—	—	—	2.52	—	0.00	2.24	0.00	0.00	0.00	0.00	0.68	15
Velletri	3.30	1.12	0.86	1.15	1.48	0.94	0.81	0.32	2.44	2.05	2.39	1.53	364
Ceccano	0.43	0.00	0.35	0.00	0.17	0.00	0.00	0.00	0.00	0.00	1.31	0.20	39
Foggia	3.42	0.86	0.51	1.88	3.76	1.84	0.00	0.34	1.71	2.66	2.40	1.76	44
Corleone	1.81	0.90	0.54	0.54	1.45	1.81	0.90	1.81	2.35	1.45	0.90	1.31	44
Med. gen. diurna	2.88	1.07	1.44	1.23	1.12	0.81	0.78	0.46	0.76	1.24	1.60	1.21	973
1881 NOVEMBRE **Decade I.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			
Bologna	1.30	1.86	0.68	0.52	0.37	0.00	0.25	0.43	0.69	1.61		0.76	58
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a	3.59	0.26	0.73	0.59	0.57	0.38	0.61	0.34	1.76	1.22		0.99	96
Firenze t n	2.24	1.52	1.03	0.70	0.83	0.93	0.85	0.89	1.41	1.74		1.26	96
Livorno	0.96	1.68	1.44	0.72	0.48	0.48	0.00	0.48	3.13	1.20		1.05	18
Fermo	1.19	—	—	—	0.46	0.11	0.65	0.77	3.97	4.53		1.66	12
M. Fortino	1.43	1.91	0.00	0.71	0.00	0.00	0.00	0.45	1.44	0.95		0.68	25
Narni	0.75	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.44		0.14	25
Viterbo	2.17	1.05	0.35	0.00	0.00	0.17	0.00	0.32	1.94	1.85		0.78	36
Roma	5.79	1.40	0.69	0.33	0.20	0.22	0.20	0.26	3.88	1.75		1.47	105
Rocca di Papa	0.00	1.68	2.52	0.84	0.00	0.00	0.00	1.68	1.68	—		0.93	19
Velletri	9.17	2.08	0.44	0.36	0.32	0.16	0.35	0.75	4.78	2.79		2.12	322
Ceccano	2.63	0.43	0.00	0.21	0.00	0.00	0.35	0.00	2.28	1.31		0.72	35
Foggia	4.58	4.40	0.17	0.77	0.18	0.51	0.90	0.86	1.66	4.32		1.91	40
Corleone	1.81	0.54	1.27	0.36	0.90	1.08	1.27	1.08	0.18	1.08		0.95	40
Med. gen. diurna	2.68	1.44	0.78	0.47	0.36	0.28	0.38	0.59	2.05	1.90		1.10	927
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**			
Bologna	1.92	0.30	—	—	—	—	0.75	1.04	1.19	1.06		1.04	33
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a	0.85	0.36	0.43	0.73	0.65	13.33	0.81	1.46	1.01	0.67		2.27	107
Firenze t. n	1.28	0.72	0.96	0.47	0.70	2.37	1.15	1.85	0.70	1.09		1.11	107
Livorno	0.96	0.48	0.96	0.48	0.48	0.55	3.32	2.21	1.44	1.68		1.25	17
Fermo	4.14	1.13	0.26	0.22	0.86	0.70	0.03	3.12	2.11	0.38		1.29	24
M. Fortino	0.47	0.00	0.00	0.00	0.00	0.00	0.00	1.91	0.95	1.43		0.47	25
Narni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.64	0.00		0.16	26
Viterbo	0.79	0.00	0.00	0.00	0.17	0.00	0.00	3.00	1.94	0.70		0.66	26
Roma	1.08	0.53	0.24	0.43	0.32	0.28	0.12	1.25	2.94	0.64		0.78	99
Rocca di Papa	1.68	2.02	0.00	2.10	0.84	0.00	2.80	0.00	0.00	2.52		1.19	29
Velletri	1.76	0.64	0.40	1.10	0.43	4.55	0.28	2.29	5.68	1.08		1.82	333
Ceccano	0.87	0.00	0.00	0.00	0.00	0.00	0.00	3.22	4.92	0.43		0.94	32
Foggia	4.06	2.49	0.81	2.27	2.55	3.08	0.38	1.66	2.95	2.49		2.27	40
Corleone	0.54	1.63	1.27	1.81	2.35	1.63	1.45	2.17	1.81	2.35		1.70	40
Med. gen. diurna	1.45	0.72	0.41	0.74	0.72	2.23	0.79	1.80	2.09	1.18		1.21	938

1 October 4.95 – 11 October 5.43 – 15 October 5.78 – 16 October 4.96 – 21-23 October 10.12

7 October 1881 13:59:21 Full Moon 14°26'15 369396.50 km

1 November 5.79 – 9 November 4.78 – 16 November 13.92 – 19 November 5.68

1881-11-05 08:42	Carinthia, Gmuend
1881-11-14 02:55	Montreux
1881-11-25 17:25	Vaud, Aigle

November 6, 1881 02:03:17 Full Moon 13°49'52 380012.05 km

November 13, 1881 23:01:27 Last quarter 21°45'01 404240.24 km

November 21, 1881 16:21:36 New Moon 29°32'50 375651.69 km

November 28, 1881 12:01:39 First quarter 06°27'09 370979.09 km

Decade III.	21	22	23	24	25	26	27	28	29	30	Media	N.d'Os.
Bologna	0.37	0.82	0 52	1.80	0.75	1.42	1.63	1.49	2 66	1.43	1.28	57
Rimini	—	—	—	—	—	—	—	—	—	—	—	—
Firenze t. a.	0.63	1.07	1.56	0.59	1.68	0.30	0.81	1 28	1.34	1.17	1.03	102
Firenze t. n.	1.02	0.89	0.87	0.70	1.67	0.33	0.72	1.41	2.37	2.30	1.22	102
Livorno	0.96	1.44	0.48	0.60	1.26	0.48	—	—	—	—	0.86	11
Fermo	0.42	0.16	0.12	0.00	0.25	0.09	0.19	0.36	0.28	0.38	0.22	20
M. Fortino	0.00	1.13	0.00	0.04	1.91	0.00	0.00	1.43	0.00	0.00	0.48	24
Narni	0.00	0.15	2.39	0.37	0.15	0.00	0.00	0.00	0.00	0.00	0.30	31
Viterbo	0.60	0.00	0.00	0.00	0.00	0.00	0.00	1.76	1.72	1.90	0.53	30
Roma	0.12	0.23	0.70	0.34	0.31	0.14	0.12	0.75	0.58	0.64	0.39	86
Rocca di Papa	0.00	2.24	1.68	2.94	0.00	1 68	0.00	0.00	0.00	0.00	0.85	25
Velletri	0.38	0.40	0.58	0.26	0.59	0.53	0.45	0.62	0.77	0.69	0.53	340
Ceccano	0.00	0.21	0.58	0.00	1.31	0.00	0.00	0.00	0.58	0.00	0.26	29
Foggia	0.73	0.86	1.03	0.60	0.56	0.51	0.00	1 03	0.17	0.12	0.56	40
Corleone	0.08	0.90	0.18	1.27	1.08	0.72	0.36	1.08	1.63	1.63	0.99	40
Med. gen. diurna	0.40	0.77	0.76	0.68	0.82	0.45	0.33	0.86	0.93	0.79	0.67	937

MEDIE MENSILI

STAZIONI	1880 Dccembre	1880 Gennaio	Febbraio	Marzo	Aprile	Maggio	Giugno	Luglio	Agosto	Settembre	Ottobre	Novembre	Media annua locale	Numero d'Osservazioni
Bologna	0.83	1.97	1.84	0.86	1.01	0.90	0.89	0.69	1.05	1.57	1.70	1.02	1.19	2187
Rimini	0.17	1.44	0.51	0.32	0.29	0.30	—	—	0.09	1.04	0.53	—	0.52	548
Firenze t. a.	1.16	2.72	1.41	0.95	0.93	0.30	0.38	0.52	0.74	0.73	1.24	1.42	1.04	3790
Firenze t. n.	1.09	3.12	1.76	1.32	1.19	0.61	0.70	0.56	0.89	1.06	1.46	1.19	1.21	3789
Livorno	2.15	5.83	1.40	2.62	2.02	1.38	1.46	1.33	1.61	1.99	2.57	1.05	2.11	680
Fermo	0.82	4.00	1.48	1.41	0.58	0.39	0.26	0 32	0.17	0.53	1.21	1.05	1.01	881
M. Fortino	1.52	1.73	1.85	1.14	0.75	1.06	1.37	0.00	0.61	0.59	0.22	0.54	0.94	825
Narni	0.26	1.05	—	1.29	0.97	0.99	—	—	0.85	0.71	—	0.20	0.79	614
Viterbo	0.88	2.68	0.80	0.93	0.50	0.29	0.17	0.13	1.34	0.57	0.84	0.65	0.73	994
Roma	1.11	2.72	1.37	1.44	0.89	0.50	0.61	0.61	0.40	0.79	0.94	0.88	1.02	2539
Bocca di Papa	1.03	2.03	1.17	1.53	1.16	1.06	1.53	1.29	1.20	1.25	.94	0.99	1.26	1058
Velletri	0.89	2.07	1.11	1.44	1.10	0.72	0.73	0.71	0.90	1.16	1.25	1.19	1.12	1169
Ceccano	0.23	1.14	0.72	0.46	0.29	0.48	0.43	0.89	0.23	0.34	0.17	0.61	0.50	1263
Foggia	1.41	2.00	1.68	2.60	1.18	0.85	0.62	1.17	1.08	—	1.70	1.58	1.44	1340
Corleone	1.41	1.48	1.36	1.40	1.41	1.30	1.34	1.03	1.09	0.95	1.01	1.21	1.25	1428
Media generale	0.99	2.43	1.31	1.32	0.95	0.79	0.82	0.75	0.79	0.97	1.17	0.99	1.07	
Tot. delle Osserv.	2751	3083	2579	3017	2871	2935	2661	2568	2745	2328	2081	2802		39021

Cholet
Tours
Digione
Basilea
Sciaffusa
BAVIERA
Zurigo
Salisburgo
Győr
Budapest
Debrecen
Bistrița
Poitiers
Bourges
Besançon
Berna
Itinerari tematici
AUSTRIA
Graz
Székesfehérvár
Oradea
Cluj-Napoca
Niort
Montluçon
Moulins
Losanna
Laghi e ghiacciai
Klagenfurt
Maribor
UNGHERIA
ROMANIA
LIMOSINO
Roanne
Sion
Bellinzona
Seghedino
Arad
Clermont-Ferrand
Lione
Ginevra
Pisco Rotondo
Trento
Celje
Kaposvár
Pécs
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CROAZIA
Novi Sad
AQUITANIA
Cahors
Valence
Venezia
Rijeka
Fiume
Drobeta-Turnu Severin
Slatina
Agen
Torino
Ferrara
Belgrado
Montauban
Alès
Gap
Modena
Banja Luka
Craiova
Auch
Genova
SERBIA
Tolosa
Imperia
Bologna
Rimini
BOSNIA-ERZEGOVINA
Kragujevac
Pleven
Tarbes
Montpellier
Nimes
Pistoia
Forlì
Monaco
Livorno
Ancona
SERBIA E MONTENEGRO
BULGARIA
Andorra la Vella
Marsiglia
Firenze
Split
Spalato
Tolone
TOSCANA
Perugia
Priština
Sofia
Perpignano
Grosseto
Bastia
Terni
Pescara
Mare Adriatico
Podgorica
SPAGNA
Figueres
Gerona
ITALIA
Pukë
Skopje
RODOPI
Lérida
Ajaccio
ABRUZZO
Scutari
Barcellona
Roma
Campobasso
Foggia
Tirana
Elbasan
Serrai
Reus
Bari
Lushnjë
Salonicco
PUGLIA
ALBANIA
Salerno
Napoli
Taranto
Véroia
Kariaí
Sassari
Valona
Kozáni
Palma di Maiorca
Sarande
Lárissa
Vólos
Mar Tirreno
Corfù
Ioánnina
Cosenza
Lamia
Cagliari
Sant'Eufemia Lamezia
Agrínion
GRECIA
Catanzaro
Patrasso
Aiyion
Mar Ionio
Atene
Mar Mediterraneo
Palermo
Messina
Athinai
Etna 3323 m
Pírgos
Tripoli
ISOLE EGEE
Biserta
Catania
SICILIA
Algeri
Dellys
Banzart
Bacino dello Ionio -5150 m
Kalámata
Bejaia
Tunisi
Ech Cheliff
Bouira
Costantina
Qacentina
Stif
Al Kāf
Khaniá
Bordj Bou Arreridj
Souk Ahras
Nābul
CRETA
Sougueur
Batna
Monastir
ALGERIA
TUNISIA
La Valletta
Lampedusa
Tébessa
MONTI DELL'ATLANTE
Biskra
Sfax

April 23, 1881 6.74 (Microseismic maximum)

June 9-14-18, 1881 → June 7 7.95 June 14 5.06 June 16 4.21 (microseismic maximums)

July 18-22 → July 20 6.16

August 3, 1881 3.28 ; August 15 5.82 ; 28 August 6.62

1 September 7.90 – 2 Sept. 6.16 – 7 Sept. 7.91 – 22 Sept. 7.71 – 23 Sept. 5.51 - 28 Sept. 6.26 - 1 Oct. 4.95 – 11 Oct. 5.43 – 15 Oct. 5.78 – 16 Oct .96 – 21-23 Oct. 10.12
1 November 5.79 – 9 Nov. 4.78 – 16 Nov. 13.92 – 19 Nov. 5.68

Average seismic maximums:

(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)/7

Input

$$\frac{1}{7}(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)$$

Result

8.488571428571428571428

To this date we add two lines of complete rotations of the apses (2*8.85 years = 17.70 years) and subtract one lunar year:

Apr 8, 2008 + 17.70 years - 354 days 8 hours 48 minutes 36 seconds

Input interpretation

(Tuesday, April 8, 2008 + 17.7 years) – 354 days 8 hours 48 minutes 36 seconds

Result

3:11:24 am CET | Monday, December 30, 2024

From this date we subtract a lunar quarter:

Dec 30, 2024 - 118 days 2 hours 56 minutes 12 seconds

Input interpretation

Monday, December 30, 2024 – 118 days 2 hours 56 minutes 12 seconds

Result

9:03:48 pm CEST | Monday, September 2, 2024

02.09.2024

Or, taking the dates of the following eclipses:

06/09/1755	9.05	Eclisse totale.	Meridionale	5.40	18.36

Let's add two synodic months:

September 6, 1755 + 59 days 1 hour 28 minutes 6 seconds

Input interpretation

Saturday, September 6, 1755 + 59 days 1 hour 28 minutes 6 seconds

Result

1:28:06 am LMT | Tuesday, November 4, 1755

04.11.1755

And from the following date:

02/10/2024	19.46	Eclisse anulare.	Meridionale	6.08	17.49

Subtracting a synodic month:

October 2, 2024 - 29 days 12 hours 44 minutes 3 seconds

Input interpretation

Wednesday, October 2, 2024 – 29 days 12 hours 44 minutes 3 seconds

Result

11:15:57 am CEST | Monday, September 2, 2024

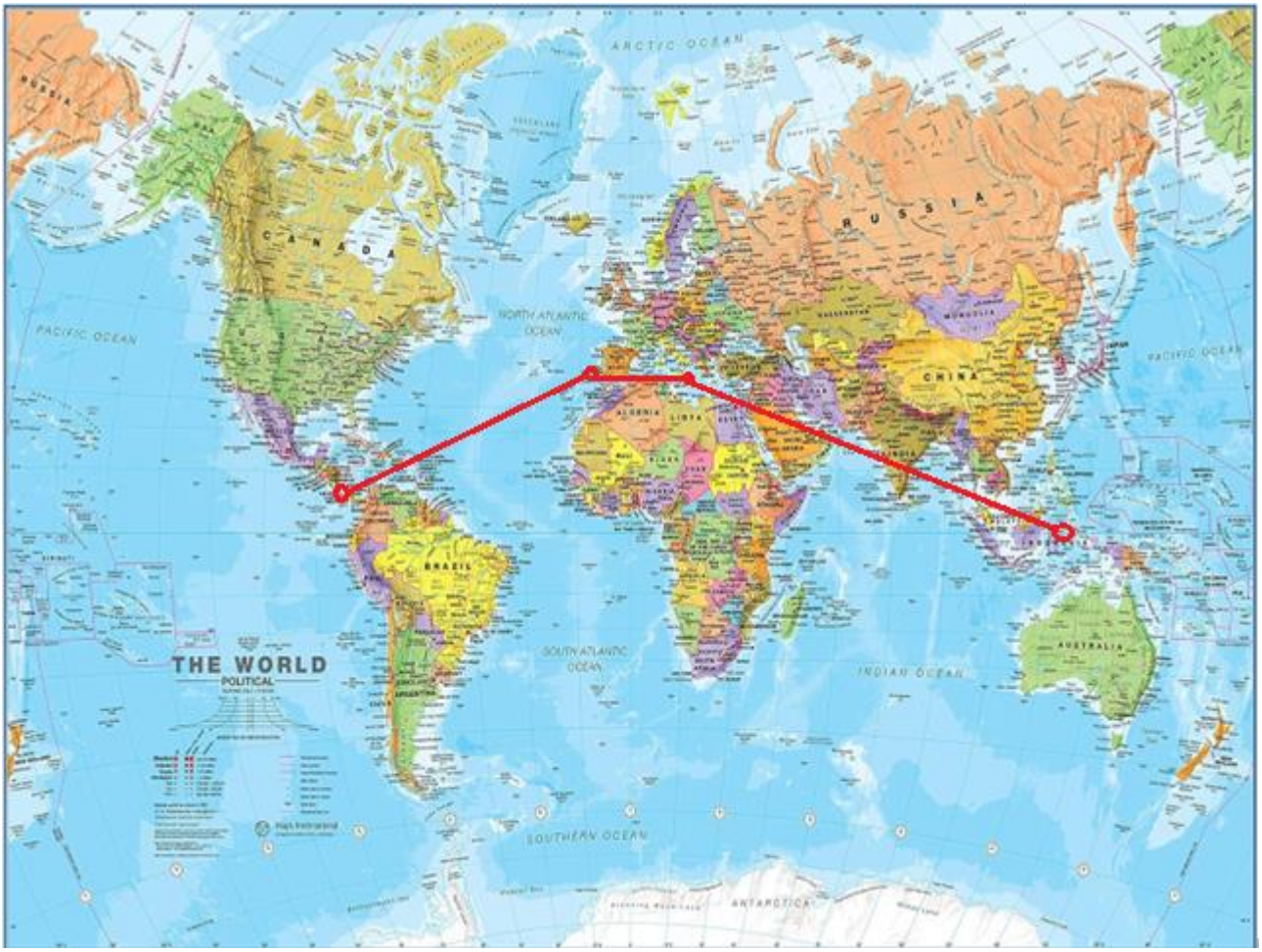
02.09.2024

August 26, 2024

An earthquake measuring 5.3 on the Richter scale was recorded in the early hours of this morning off the coast of the city of Sines, and the tremor was also felt in Lisbon. According to data from the Portuguese Institute of the Sea and the Atmosphere (IPMA), the earthquake had its epicenter in the Atlantic, 70 km southwest of Sesimbra. According to the Portuguese institute, the tremor was felt in Portugal, Spain and Morocco. “Three other aftershocks of the earthquake felt at 5:11 have already been felt, with values of 1.2, 1.1 and 0.9 on the Richter scale,” said André Fernandes, national commander of the Civil Protection. “It is a perfectly normal situation and we are now in a monitoring phase.”

Data e Ora (Italia)	Magnitudo	Zona
2024-08-27 14:47:43	ML 3.9	Mar Ionio Settentrionale (MARE)
2024-08-27 05:39:49	ML 2.9	Tirreno Meridionale (MARE)
2024-08-27 04:15:20	**Mwp 5.8**	**Indonesia [Sea]**
2024-08-26 15:14:15	ML 2.1	4 km SW Serravalle di Chienti (MC)
2024-08-26 11:47:42	ML 2.3	3 km SE Fontanelice (BO)
2024-08-26 07:08:45	**Mwp 5.8**	**South of Panama [Sea: Panama]**
2024-08-26 06:34:38	ML 2.0	3 km W Apricena (FG)
2024-08-26 06:11:38	**mb 5.0**	**Portugal [Sea]**
2024-08-26 03:34:32	ML 2.2	4 km SE Castel del Rio (BO)
2024-08-26 03:05:44	ML 2.0	Confine Italia Svizzera (SVIZZERA)
2024-08-26 02:02:06	ML 2.4	Borgo Tossignano (BO)

Data e Ora (Italia)	Magnitudo	Zona
2024-08-26 01:53:02	ML 2.3	2 km N Borgo Tossignano (BO)
2024-08-26 01:45:43	ML 3.9	3 km SE Castel del Rio (BO)
2024-08-26 01:29:09	**Mwp 6.8**	**Tonga Islands [Sea: Tonga]**



On **February 16, 1861**, there was a very violent earthquake in Sumatra, Indonesia. These are the lunar phases of that period:

9 February 1861 20:04:38 New Moon 21°07'47 396863.84 km

18 February 1861 00:19:42 First Quarter 29°23'17 398290.59 km

To this date we add 1 Saros Cycle and subtract 2 synodic months:

february 16, 1861 + 108 years 68 days 4 hours 12 minutes - 58.54 days

Input interpretation

(Saturday, February 16, 1861 + 108 years 68 days 4 hours 12 minutes) –
58.540 days

Result

3:14:24 pm CET | Tuesday, February 25, 1969

This date (February 25, 1969) is very close to the date of **February 28, 1969**, when there was a strong earthquake that hit Portugal and Morocco.

March 4, 1969 05:17:03 Full Moon 13°27'39 387679.14 km

Let's add to this date 3 Saros cycles:

February 25, 1969+54 years 34 days 2 hours 6 minutes

Input interpretation

Tuesday, February 25, 1969 + 54 years 34 days 2 hours 6 minutes

Result

2:06 am CEST | Friday, March 31, 2023

We note that:

20/04/2023	5.24	Eclisse totale.	Meridionale	5.23	18.56

Adding to the date obtained above 5 synodic months:

March 31, 2023 + 146 days 8 hours 24 minutes

Input interpretation

Friday, March 31, 2023 + 146 days 8 hours 24 minutes

Result

8:24 am CEST | Thursday, August 24, 2023

To that date, adding 1 lunar year, we get:

August 24, 2023 + 354 days 8 hours 48 minutes 36 seconds

Input interpretation

Thursday, August 24, 2023 + 354 days 8 hours 48 minutes 36 seconds

Result

8:48:36 am CEST | Monday, August 12, 2024

Doing the same calculation with the date of the eclipse:

April 20, 2023 + 146 days 8 hours 24 minutes

Input interpretation

Thursday, April 20, 2023 + 146 days 8 hours 24 minutes

Result

8:24 am CEST | Wednesday, September 13, 2023

Adding to this date a synodic year:

September 13, 2023 + 354 days 8 hours 48 minutes 36 seconds

Input interpretation

Wednesday, September 13, 2023 + 354 days 8 hours 48 minutes 36 seconds

Result

8:48:36 am CEST | Sunday, September 1, 2024

Both dates, **August 12** and **September 1, 2024**, are close to **August 26, 2024**, the date of the 5.3 magnitude earthquake that occurred in Portugal.

August 26, 2024 09:25:50 Last quarter 03°38'10 376666.64 km

September 3, 2024 01:55:34 New Moon 11°04'12 403894.36 km

Let's go back to the date of November 1, 1755 (Lisbon Earthquake). Here is the lunar phase of that period:

November 4, 1755 03:08:41 New Moon 11°24'50 356902.18 km

Let's add to it 5 Saros cycles:

November 1, 1755 + 90 years 56 days 19 hours 30 minutes

Input interpretation

Saturday, November 1, 1755 + 90 years 56 days 19 hours 30 minutes

Result

7:30 pm LMT | Saturday, December 27, 1845

Adding 1 Saros cycle to the result obtained:

December 27, 1845 + 18 years, 11 days, 8 hours and 42 minutes

Input interpretation

Saturday, December 27, 1845 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am LMT | Thursday, January 7, 1864

Subtracting 3 synodic years from the above result, we obtain:

January 7, 1864 - 1063 days 2 hours 25 minutes 48 seconds

Input interpretation

Thursday, January 7, 1864 – 1063 days 2 hours 25 minutes 48 seconds

Result

9:34:12 pm LMT | Thursday, February 7, 1861

Result close to the date of **February 16, 1861**, in which there was a very violent earthquake in Sumatra (Indonesia)

February 9, 1861 20:04:38 New Moon 21°07'47 396863.84 km

February 18, 1861 00:19:42 First quarter 29°23'17 398290.59 km

Let's now analyze these additional earthquakes, which occurred close to eclipse dates, in the Urbino area (Marche):

14/04/1828	10.24	Eclisse totale.	Settentrionale	5.32	18.50

1828. ***Aprile, notte dal 13 al 14.*** **Fortissimo.**

01/02/1851	6.57	Eclisse anulare.	Meridionale	7.24	17.25

1851. ***11 Febbraio.*** **Il conte Domenico Paoli da Pesaro mi scrisse che ivi ebbero a ore 5. 11' circa (credo pomeridiane) una piccola scossa di terremoto.**

1851. ***28 Maggio, 9 pom.*** **Terremoto della vigilia dell'Ascensione. Fu sentito anche a Cortona e a Castiglione (presso Cortona) qualche minuto prima delle 9 pom., nella direzione da N a S, e con mediocre intensità. Lo sentirono anche Siena, Firenze, Lucca.**

06/06/1853	21.07	Eclisse anulare.	Meridionale	4.35	19.42

1853. *22 Giugno, 0. 28' ant.* Assai gagliardo.

26/05/1854	21.46	Eclisse anulare.	Settentrionale	4.41	19.33

1854. *22 Maggio, 3. 36' pom.* Due leggiere scosse di 2'' l'una, coll'intervallo di forse 2''. Qualcuno crede aver notata la direzione verso NE.

1854. *16 Giugno, 2. 31' pom.* Terremoto per circa 8'' ondulatorio per SW-NE. È cominciato con movimento sussultorio, e poi un momento quietò, e poi riprese per 2'' o 3. Il vento SW rinforzò dopo il terremoto. È stato sentito anche a Bologna.

29/09/1856	4.58	Eclisse anulare.	Settentrionale	6.05	17.55

1856. *31 Agosto, 3. 37' ant.* Terremoto piuttosto lungo da E a W. Il barometro è alto, e alza sempre più.

1856. *12 Ottobre, 2. 0 ant.* Prolungato, ma non forte.

25/03/1857	23.30	Eclisse totale.	Meridionale	6.05	18.28
18/09/1857	6.36	Eclisse anulare.	Settentrionale	5.53	18.15

1857. *15 Marzo, 6. 45' (ant.?).* Scossa ondulatoria sentita da parecchi da E a W.

1857. *3 Settembre, 5. 0 ant.* Ondulatorio.

18/07/1860	15.24	Eclisse totale.	Settentrionale	4.50	19.41

1860. *15 Luglio, 2. 3/4 ant.* Cinque piccole ondulazioni.

31/12/1861	14.50	Eclisse totale.	Settentrionale	7.38	16.49

1861. *7 Dicembre, 10. 1/2 ant.* Prima scossa per 4 secondi, che ha fatto sonare qualche campanello; ondulatoria, nella direzione probabile da E a W, seguita da una seconda assai più debole.

1861. *8 Dicembre, 5. 1/2 ant.* Si ripete un piccolo terremoto. È curioso che questa ripetizione si fa in ordine al tempo come nel marzo.

19/10/1865	17.21	Eclisse anulare.	Settentrionale	6.27	17.23

1865. *24 Settembre*, 11. 1/2 *ant.* Piuttosto forte, ma breve.

06/03/1867	10.48	Eclisse anulare.	Settentrionale	6.38	18.06

1867. *29 Marzo*, 7. 25' *pom.* Urto assai violento, seguito da un nuovo urto più debole; e poi agitazione vaga crescente per circa 5''. La direzione prevalente sembrò da W a E.

1867. *30 Marzo*, 4. 10' *ant.* Altra minima scossa sentita da pochi.

18/08/1868	6.12	Eclisse totale.	Meridionale	5.21	19.05

1868. *2 Agosto*, 10. 15' *pom.* Lieve.

1868. *26 Agosto*, 8. 42' *ant.* Ondulatorio per 8'', con piccola tregua dopo i primi quattro.

31/01/1870	16.31	Eclisse parziale. Magnitud. = 0,47	Meridionale	7.24	17.24
29/06/1870	0.45	Eclisse parziale. Magnitud. = 0,64	Meridionale	4.37	19.49
22/12/1870	13.31	Eclisse totale.	Settentrionale	7.35	16.43

1870. *8 Febbraio, 5. o pom. circa.* Forte scossa preceduta da romba sotterranea. Ha fatto sonare qualche campanello.

1870. *1 Marzo, 8. 40' pom.* Due scosse assai sensibili.

1870. *24 Giugno, 6. o pom. circa.* Due scosse ondulatorie; la prima leggiera, la seconda più sensibile, però avvertite da pochi.

1870. *21 Novembre, o. 15' ant.* Ondulatorio.

22/12/1870	13.31	Eclisse totale.	Settentrionale	7.35	16.43

1871. *6 Gennaio, 11. o pom. circa.* Terremoto.

18/06/1871	3.34	Eclisse anulare.	Meridionale	4.34	19.48

1871. *2 Giugno, 10. 45' pom.* Terremoto.

30/11/1872	19.26	Eclisse totale.	Meridionale	7.18	16.40

1872. *2 Novembre, 1. 26' pom.* Due scosse ondulatorie, con un minuto d' intervallo. La prima più forte durò circa 6", la seconda circa 4".

26/05/1873	10.13	Eclisse parziale. Magnitud. = 0,89	Settentrionale	4.40	19.34

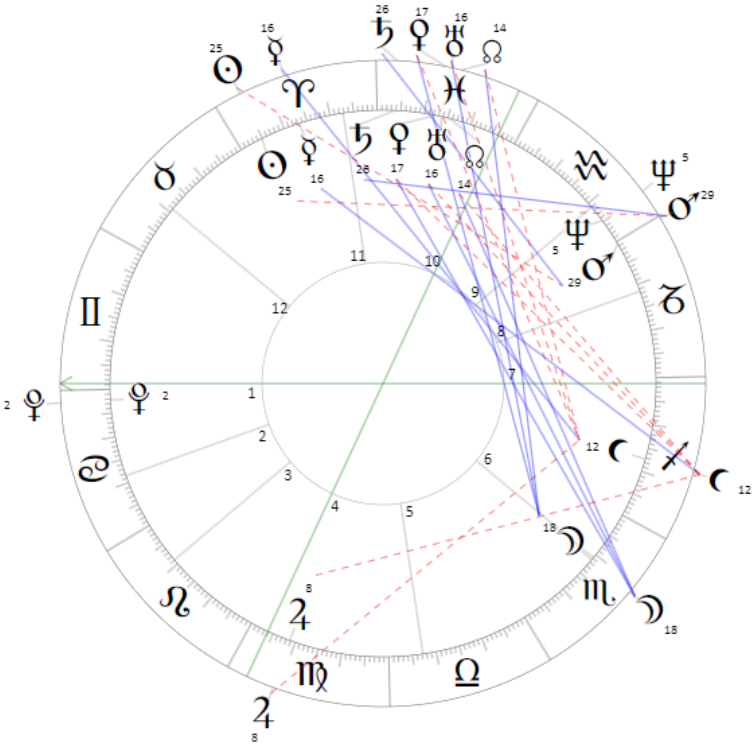
1873. *7 Maggio, 8. 11' ant.* Lieve scossa sentita da pochissimi. Alla stessa ora fu sentito distintamente a Cagli.

1873. *20 Maggio, 4. 45' ant.* A Macerata (Marche) forte scossa, ma di breve durata.

April 14, 1672 strong earthquake in Rimini

28/02/1672	15.51	Eclisse anulare.	Meridionale	6.48	17.59

March 6, 1672 → Jupiter opposition



Luna → Urano-Venere

April, 14 1672 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Thursday, April 14, 1672 (Gregorian calendar) +
108 years 68 days 4 hours 12 minutes

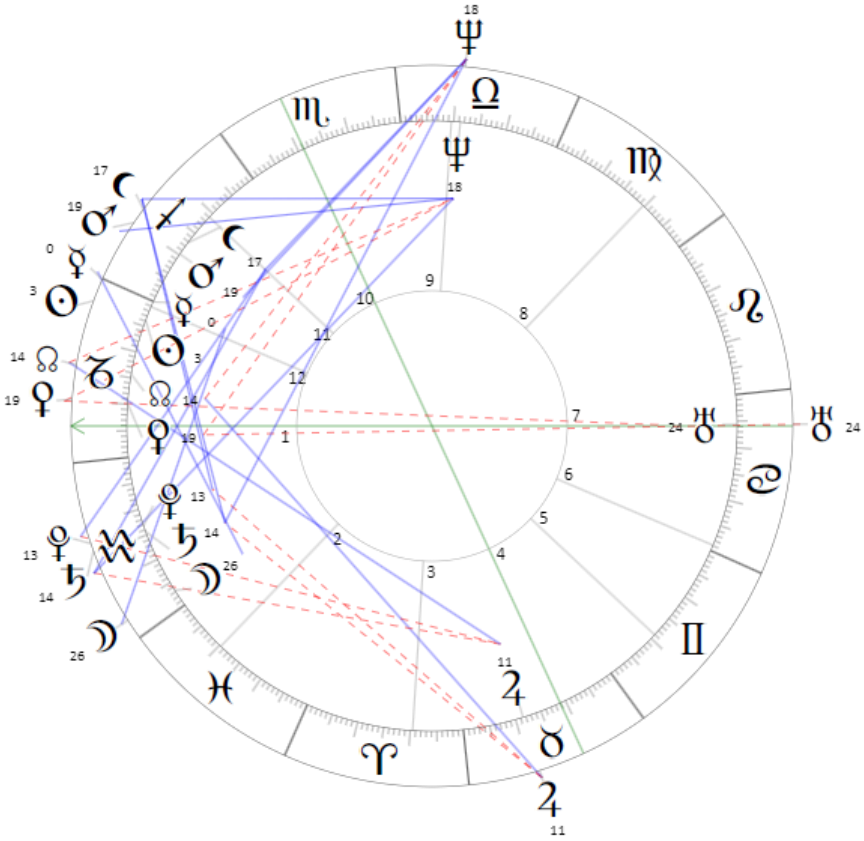
Result

4:12 am LMT | Wednesday, June 21, 1780

December 25, 1786 strong earthquake in Rimini

20/12/1786	18.03	Eclisse parziale. Magnitud. = 0,07	Meridionale	7.34	16.42

January 4, 1787 - Inferior Conjunction of Venus



Luna → Plutone-Saturno ; Giove → Venere ; Urano → Venere ; Nettuno → Venere

Giove → Urano → Nettuno → Venere

December 25, 1786 + 108 years 68 days 4 hours 12 minutes

Input interpretation

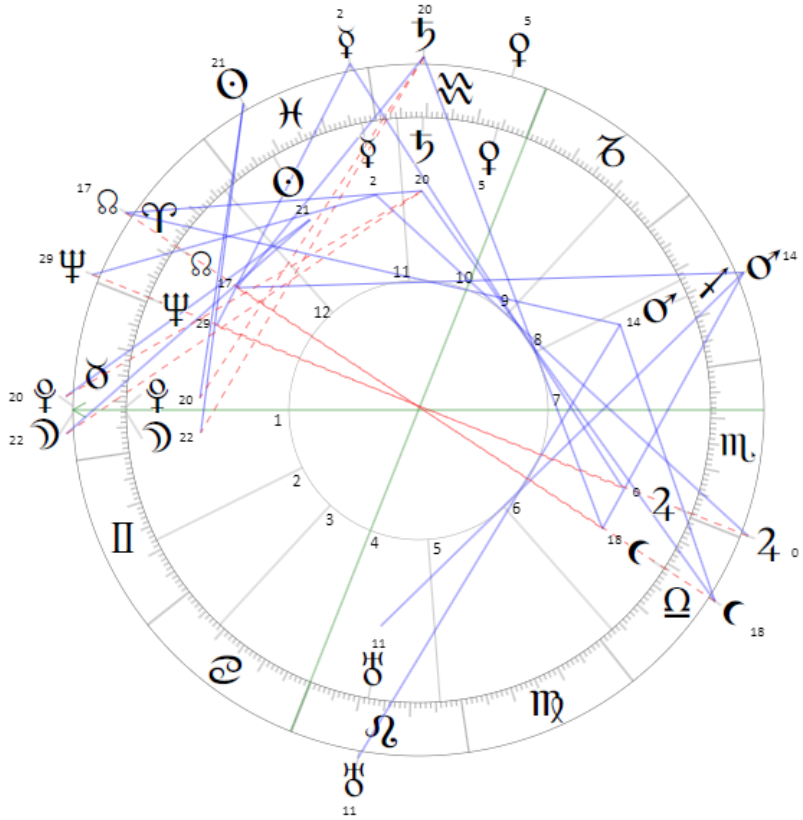
Monday, December 25, 1786 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CET | Sunday, March 3, 1895

March 12, 1875 strong earthquake in Rimini

06/04/1875	7.37	Eclisse totale.	Meridionale	5.45	18.40



Saturno → Luna ; Giove → Nettuno

March, 12 1875 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Friday, March 12, 1875 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Thursday, May 19, 1983

April, 14 1672 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Thursday, April 14, 1672 (Gregorian calendar) +
108 years 68 days 4 hours 12 minutes

Result

4:12 am LMT | Wednesday, June 21, 1780

June 21, 1780 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Wednesday, June 21, 1780 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am RMT | Tuesday, August 28, 1888

August 28, 1888 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Tuesday, August 28, 1888 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CET | Monday, November 4, 1996

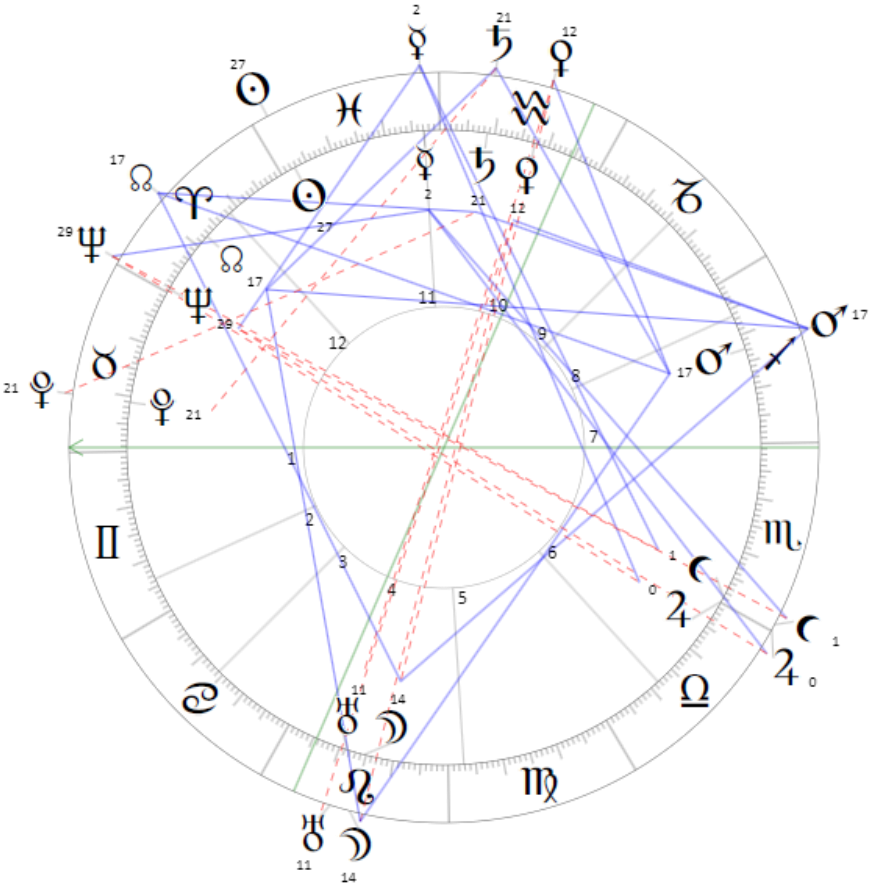
On the earthquake of March 17-18, 1875

Moon phases:

March 14, 1875 13:05:40 First quarter 23°34'14 373234.63 km

March 21, 1875 23:51:50 Full Moon 00°58'17 398418.84 km

Transit sky of Thursday, March 18, 1875 at 08:00:00, Rome, Italy



Venere-Luna ; Giove-Nettuno ; Mercurio-Giove ; Venere-Urano

Mercurio-Saturno-Giove; → Venere-Luna-Urano ; Mercurio-Saturno-Giove

Now, let's consider the date of a strong eruption of Vesuvius. The spectacular and dramatic eruption of 1872 began on April 24 and finally ended on May 2. To this date, let's add 8 Saros cycles:

April 24, 1872 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Wednesday, April 24, 1872 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Saturday, July 23, 2016

July 23, 2016

Seismicity prior to the event of August 24, 2016 of magnitude Mw 6.0 between the provinces of Rieti and Perugia, is the following:

The events of greater magnitude were located respectively on July 5, 2016 (ML 3.9) in the Ionian Sea and on July 30, 2016 (Mw 3.7) in the province of Turin.

Let's note the lunar phases:

July 4, 2016 11:01:00 New Moon 12°53'32 371871.68 km

August 2, 2016 20:44:33 New Moon 10°57'46 382285.88 km

2016-07-30 22:40:05	ML 2.5	Confine Italia Austria (AUSTRIA)	5	47.23	11.75
2016-07-30 22:25:08	ML 2.1	3 km NW Pramollo (TO)	14	44.93	7.19
2016-07-30 22:21:38	Mw 3.7	2 km SW Pinasca (TO)	15	44.93	7.21
2016-07-30 22:01:11	ML 2.6	2 km NE Gravina in Puglia (BA)	9	40.84	16.43
2016-07-30 06:49:25	ML 2.2	Costa Siciliana nord orientale (Messina)	118	38.38	15.40
2016-07-30 03:19:32	ML 2.3	Adriatico Centrale (MARE)	35	43.43	14.39

2016-08-05 22:18:17	ML 2.6	Costa Marchigiana Anconetana (Ancona)	6	43.57	13.76
2016-08-05 16:00:10	ML 2.1	3 km E Arquata del Tronto (AP)	14	42.78	13.33
2016-08-05 13:28:17	ML 2.0	Costa Siciliana nord orientale (Messina)	113	38.33	15.18
2016-08-04 20:51:07	ML 2.3	5 km E Bagno di Romagna (FC)	8	43.85	12.05
2016-08-04 12:14:17	ML 3.6	Tirreno Meridionale (MARE)	322	38.79	14.65
2016-08-03 20:56:23	ML 2.2	4 km SW Oliveri (ME)	8	38.10	15.02
2016-08-02 14:33:10	ML 2.4	Adriatico Centrale (MARE)	10	42.25	15.91
2016-08-02 05:14:37	ML 2.1	5 km SE Sapri (SA)	10	40.04	15.67
2016-08-01 23:39:37	ML 2.0	8 km SW Palazzuolo sul Senio (FI)	7	44.05	11.51
2016-08-01 16:03:32	ML 2.6	Adriatico Meridionale (MARE)	9	41.64	16.76
2016-08-01 16:02:09	ML 2.2	5 km NW Potenza (PZ)	23	40.66	15.76
2016-08-01 05:34:18	ML 2.3	1 km NE Romagnano al Monte (SA)	10	40.63	15.45
2016-08-01 02:16:42	ML 2.2	Costa Siciliana nord orientale (Messina)	113	38.27	15.19

2016-07-06 00:53:19	ML 2.7	1 km NE San Carlo Canavese (TO)	36	45.26	7.62
2016-07-05 07:54:37	ML 3.9	Mar Ionio Meridionale (MARE)	41	37.50	17.05
2016-07-05 01:37:10	Md 2.0	4 km SW Sant'Arcangelo (PZ)	25	40.21	16.26
2016-07-04 20:37:00	ML 2.0	1 km S Felonica (MN)	11	44.98	11.35
2016-07-04 15:21:48	ML 2.2	Tirreno Meridionale (MARE)	147	38.60	15.52
2016-07-04 13:37:22	ML 3.5	8 km SW Felonica (MN)	9	44.93	11.29
2016-07-04 12:22:02	ML 3.3	Tirreno Meridionale (MARE)	251	38.87	15.44
2016-07-04 00:53:12	ML 2.8	1 km SW Montieri (GR)	10	43.12	11.01
2016-07-03 17:44:44	ML 3.0	3 km E Roccaraso (AQ)	11	41.86	14.11
2016-07-03 12:14:13	ML 2.5	5 km S Serracapriola (FG)	14	41.77	15.17
2016-07-03 10:28:47	ML 2.1	1 km SE Casina (RE)	23	44.51	10.51
2016-07-02 19:06:51	ML 2.2	2 km E Tizzano Val Parma (PR)	24	44.53	10.23
2016-07-02 14:11:14	ML 2.1	Costa Calabra sud orientale (Reggio di Calabria)	27	37.64	15.83

2016-07-02 10:04:39	ML 3.1	Mar Ionio Meridionale (MARE)	43	37.18	19.16
2016-07-02 04:29:54	ML 2.3	Costa Siciliana nord orientale (Messina)	117	38.37	15.44
2016-07-01 06:51:14	ML 2.3	1 km NE Terme Vigliatore (ME)	8	38.14	15.17
2016-06-30 05:53:00	ML 2.0	1 km NE Terme Vigliatore (ME)	8	38.14	15.17
2016-06-30 05:10:06	ML 2.4	5 km S Acquasanta Terme (AP)	22	42.73	13.42
2016-06-30 03:45:24	ML 2.1	1 km N Tizzano Val Parma (PR)	23	44.53	10.20

The date we get from the previous calculation is July 23, 2016, when an earthquake occurred in the Aeolian Islands:

Data e Ora (Italia)	Magnitudo	Zona	Profondità	Latitudine	Longitudine
2016-07-23 05:18:59	ML 2.0	Isole Eolie (Messina)	9	38.66	14.34

The **2016-2017 seismic sequence of Central Italy**, defined by the INGV as the **Amatrice-Norcia-Visso seismic sequence**, began in **August 2016** with epicenters located between the Sibillini Mountains, the upper Tronto Valley, the Laga Mountains and the Alto Aterno Mountains. The first strong shock occurred on August 24, 2016, at 3:36 am and had a magnitude of 6.0, with the epicenter located along the Tronto Valley, between the municipalities of Accumoli (RI) and Arquata del Tronto (AP).[15] Two powerful aftershocks occurred on 26 October 2016 with epicentres on the Umbria-Marche border, between the municipalities of Visso, Ussita and Castelsantangelo sul Nera in the province of Macerata (the first shock at 7.11pm with a magnitude of 5.4 and the second at 9.18pm with a magnitude of 5.9).

The dates of the eclipses/lunar phases closest to that of the first strong earthquake in the sequence are:

01/09/2016	10.09	Eclisse anulare.	Meridionale	5.36	18.43

Thursday, August 25, 2016 03:40:50 Last quarter 02°22'17 370770.23 km

Thursday, September 1, 2016 09:03:06 New Moon 09°21'11 392890.00 km

Data e Ora (Italia)	Magnitudo	Zona	Profondità	Latitudine	Longitudine
2016-08-24 03:46:12	ML 3.7	8 km E Norcia (PG)	7	42.76	13.18
2016-08-24 03:44:56	ML 3.2	2 km W Amatrice (RI)	11	42.63	13.27
2016-08-24 03:44:38	ML 2.7	4 km SE Accumoli (RI)	11	42.68	13.29
2016-08-24 03:43:58	ML 3.4	5 km NW Accumoli (RI)	11	42.73	13.21
2016-08-24 03:42:07	ML 3.6	5 km E Norcia (PG)	10	42.78	13.16
2016-08-24 03:41:38	ML 3.9	6 km E Norcia (PG)	10	42.78	13.17
2016-08-24 03:40:46	ML 3.2	7 km E Norcia (PG)	10	42.77	13.17
2016-08-24 03:37:26	**ML 4.5**	**2 km N Accumoli (RI)**	9	42.71	13.25
2016-08-24 03:36:32	**Mw 6.0**	**1 km W Accumoli (RI)**	8	42.70	13.23
2016-08-24 02:51:41	ML 2.8	Tirreno Meridionale (MARE)	26	38.71	13.85

Data e Ora (Italia)	Magnitudo	Zona	Profondità	Latitudine	Longitudine
2016-09-01 14:05:59	ML 2.1	4 km NW Amatrice (RI)	13	42.65	13.25
2016-09-01 13:35:57	Mw 3.3	4 km N Capitignano (AQ)	11	42.56	13.30
2016-09-01 13:31:05	ML 2.4	8 km SE Norcia (PG)	10	42.76	13.18
2016-09-01 13:10:06	ML 2.2	5 km N Capitignano (AQ)	11	42.56	13.31
2016-09-01 13:02:43	ML 3.1	6 km E Norcia (PG)	11	42.81	13.17
2016-09-01 12:16:04	ML 2.6	2 km NE Amatrice (RI)	13	42.65	13.30
2016-09-01 11:40:29	ML 3.1	6 km NW Arquata del Tronto (AP)	10	42.81	13.24
2016-09-01 10:14:36	ML 2.0	5 km S Amatrice (RI)	11	42.58	13.30
2016-09-01 08:54:22	ML 2.9	Canale di Sicilia meridionale (MARE)	52	36.22	12.65
2016-09-01 08:49:34	ML 3.2	8 km SE Castelsantangelo sul Nera (MC)	10	42.85	13.23
2016-09-01 08:34:39	ML 2.0	1 km SE Arnara (FR)	14	41.58	13.40
2016-09-01 07:57:30	ML 2.1	6 km W Montegallo (AP)	9	42.86	13.26
2016-09-01 07:56:24	ML 2.2	7 km NW Accumoli (RI)	11	42.74	13.19
2016-09-01 07:51:52	ML 2.3	2 km E Norcia (PG)	13	42.79	13.12
2016-09-01 06:54:14	ML 2.5	2 km NE Capitignano (AQ)	18	42.53	13.32
2016-09-01 06:35:33	ML 2.0	6 km W Campotosto (AQ)	11	42.57	13.31
2016-09-01 06:00:12	ML 2.2	2 km E Amatrice (RI)	9	42.63	13.31
2016-09-01 05:53:04	Mw 3.6	2 km SE Amatrice (RI)	9	42.62	13.31
2016-09-01 05:43:22	ML 2.9	6 km E Norcia (PG)	9	42.77	13.16
2016-09-01 05:42:05	ML 2.1	6 km SW Amatrice (RI)	10	42.58	13.27
2016-09-01 05:12:57	ML 2.2	6 km E Norcia (PG)	14	42.77	13.16
2016-09-01 05:08:18	ML 2.3	3 km SE Amatrice (RI)	10	42.61	13.31
2016-09-01 04:32:48	ML 2.3	1 km SE Comunanza (AP)	20	42.95	13.42
2016-09-01 04:31:57	ML 2.2	1 km SE Fagnano Alto (AQ)	8	42.25	13.59
2016-09-01 03:59:06	ML 2.0	6 km E Norcia (PG)	10	42.77	13.16
2016-09-01 03:55:52	ML 3.2	6 km SE Castelsantangelo sul Nera (MC)	15	42.84	13.18
2016-09-01 02:21:47	ML 2.0	6 km NW Accumoli (RI)	13	42.74	13.20
2016-09-01 02:08:26	ML 2.1	4 km NE Cittareale (RI)	12	42.65	13.19

Now, from the previous results we got: 23°34'14", 29° 23'; 21° 07' and 11°24', let's analyze the following three earthquakes:

Lisbona 38°42′N 9°11′W

Sumatra 3°35′N 98°40′E

Rimini 44°03′34″N 12°34′06″E

We perform the following calculations:

2*(23°34'14")-2((2sqrt2)/Pi)°

Input interpretation

$$2\,(23\text{ degrees }\ 34\text{ arcminutes }\ 14\text{ arcseconds}) - 2\times\frac{2\sqrt{2}}{\pi}{}^\circ\ \text{(degrees)}$$

Results

45 degrees 20 arcminutes 25.72 arcseconds

1/2(23°34'14")+((2√2)/Pi)°

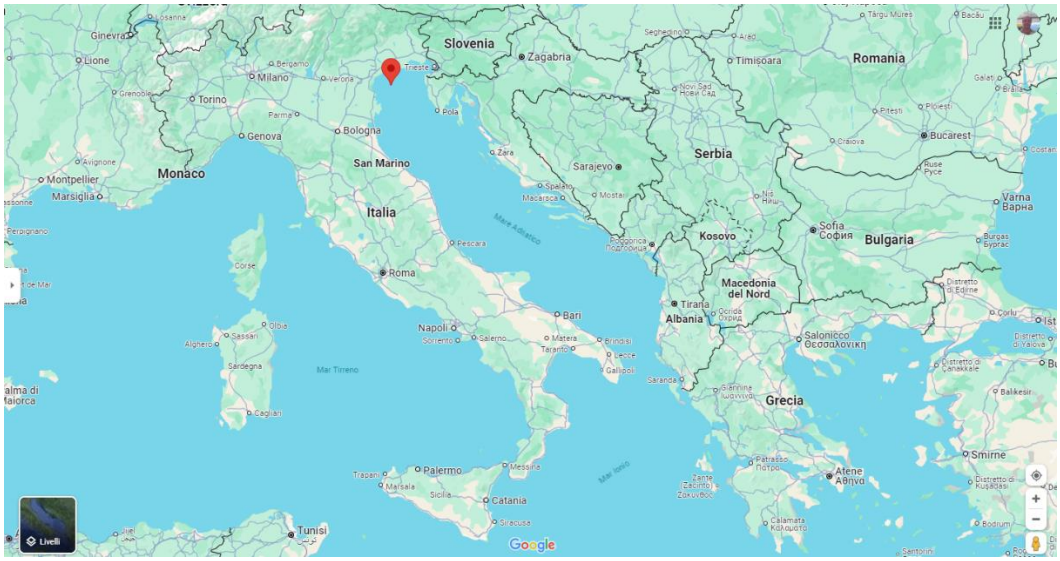
Input interpretation

$$\frac{1}{2}\,(23\text{ degrees }\ 34\text{ arcminutes }\ 14\text{ arcseconds}) + \frac{2\sqrt{2}}{\pi}{}^\circ\ \text{(degrees)}$$

Results

12 degrees 41 arcminutes 8.139 arcseconds

45°20'00.0"N 12°41'00.0"E (sea in front of Jesolo)



((29° 23') - (21° 07'))/2 - ((2sqrt2)/Pi)°

Input interpretation

$$\frac{1}{2}(29 \text{ degrees } 23 \text{ arcminutes} - 21 \text{ degrees } 7 \text{ arcminutes}) - \frac{2\sqrt{2}}{\pi}° \text{ (degrees)}$$

Results

3 degrees 13.98 arcminutes

2((29° 23') + (21° 07'))-((2sqrt2)/Pi)°

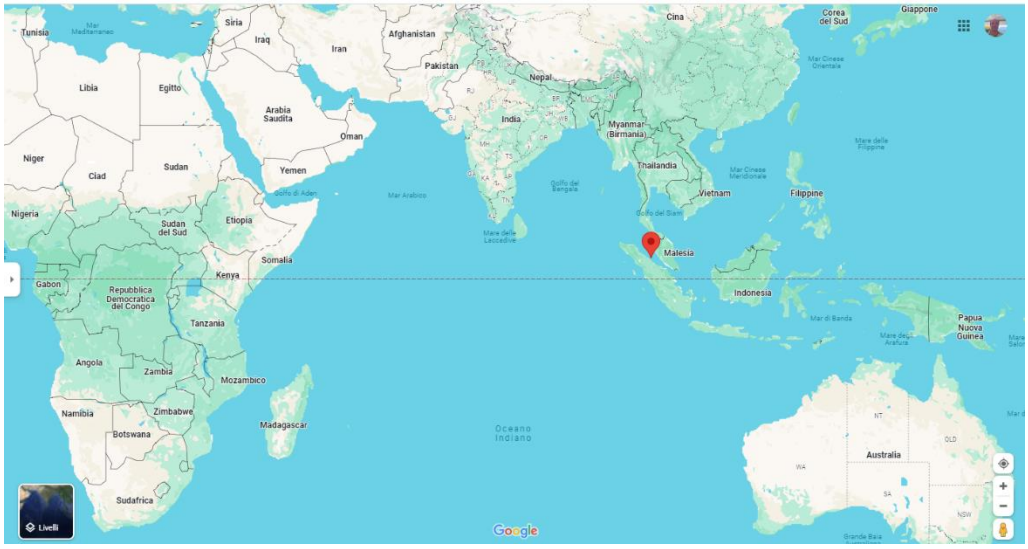
Input interpretation

$$2\,(29\text{ degrees}\;\;23\text{ arcminutes} + 21\text{ degrees}\;\;7\text{ arcminutes}) - \frac{2\sqrt{2}}{\pi}\,^\circ\ \text{(degrees)}$$

Results

100 degrees 5.981 arcminutes

3°14'00.0"N 100°06'00.0"E (Straits of Malacca)



3*(11°24')+5((2sqrt2)/Pi)°

Input interpretation

$$3\,(11\text{ degrees}\;\;24\text{ arcminutes}) + 5\times\frac{2\sqrt{2}}{\pi}\,^\circ\ \text{(degrees)}$$

Results

38 degrees 42.09 arcminutes

(11°24')-2((2sqrt2)/Pi)°

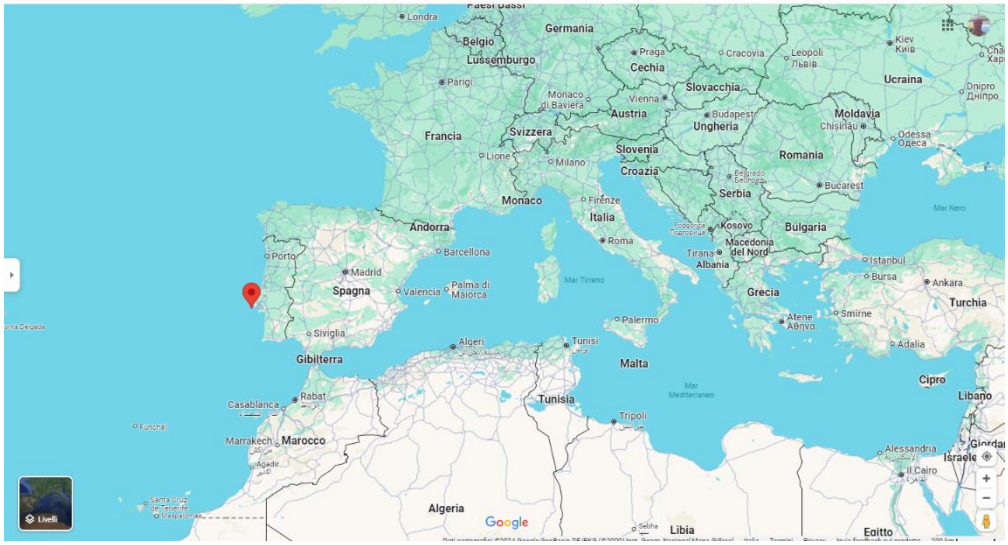
Input interpretation

$$11 \text{ degrees } 24 \text{ arcminutes} - 2 \times \frac{2\sqrt{2}}{\pi}° \text{ (degrees)}$$

Results

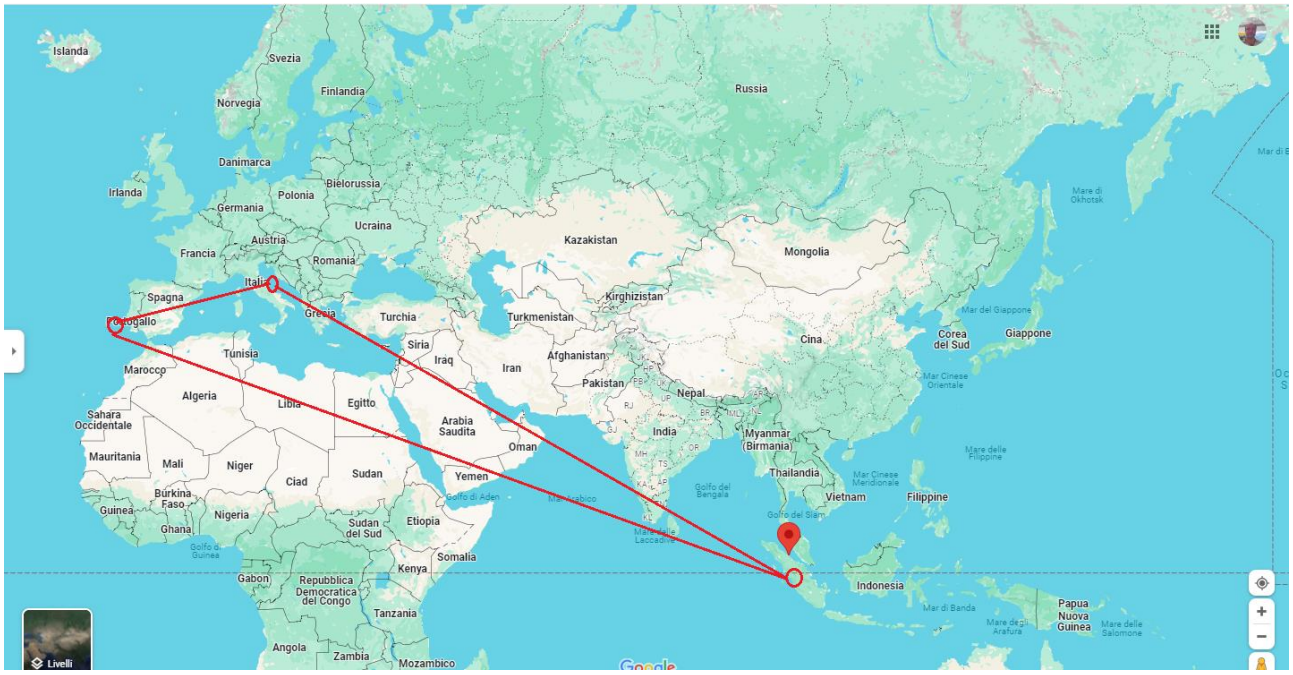
9 degrees 35.96 arcminutes

38°42'00.0"N 9°36'00.0"W North Atlantic Ocean (off Lisbon)



Lisbona – Trieste-Venezia – Indonesia

Calculated seismic radiant map



Real seismic events map

Lisbona – Trieste-Venezia-Etna – Filippine (Grablovitz’s radiant)

The 1857 Basilicata earthquake was an earthquake that occurred on December 16, 1857 in the Kingdom of the Two Sicilies, specifically in Basilicata.

Adding to that date 8 Saros cycles:

December 16, 1857 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Wednesday, December 16, 1857 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Saturday, March 16, 2002

We note that:

2002-03-10	12:39	Tirreno meridionale
2002-03-24	23:05	Etna - Versante orientale

Giovedi	14	Marzo	2002	02:02:31	Luna Nuova	23°18'44 406 707.13 km
Venerdi	22	Marzo	2002	02:28:13	Primo quarto	01°17'28 383 328.36 km
Giovedi	28	Marzo	2002	18:24:53	Luna Piena	07°53'33 357 207.65 km

Mar 16, 2002 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Saturday, March 16, 2002 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Friday, March 27, 2020

2020-03-17		Tirreno meridionale
2020-03-22	10:32	Etna - Versante orientale

16 Marzo	2020	09:34:11	Ultimo quarto	26°15'32	382 632.19 km
24 Marzo	2020	09:28:13	Luna Nuova	04°12'16	406 672.41 km

January 11, 1693

January 11, 1693 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Sunday, January 11, 1693 (Gregorian calendar) +
144 years 90 days 21 hours 36 minutes

Result

9:36 pm LMT | Tuesday, April 11, 1837

April 11-12, 1837 – Very strong earthquake in Lunigiana!!! (Fr. Giuseppe Mercalli)

Mercoledi 5 Aprile 1837 07:20:04 Luna Nuova 15°18'09 373 907.24 km

Mercoledi 12 Aprile 1837 23:13:35 Primo quarto 22°49'13 404 041.79 km

April 11, 1837 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Tuesday, April 11, 1837 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am LMT | Sunday, April 22, 1855

1-27 May 1855 – strong eruption of Vesuvius

Mercoledi 2 Maggio 1855 04:03:24 Luna Piena 11°10'22 383 497.30 km

Mercoledi 9 Maggio 1855 03:02:02 Ultimo quarto 17°54'12 369 731.90 km

Mercoledi 16 Maggio 1855 02:13:18 Luna Nuova 24°37'28 383 641.59 km

Giovedi 24 Maggio 1855 00:02:47 Primo quarto 02°13'58 403 769.17 km

Giovedi 31 Maggio 1855 14:48:04 Luna Piena 09°32'02 372 816.02 km

16/05/1855	3.05	Eclisse parziale. Magnitud. = 0,76	Settentrionale	4.49	19.23

June 3, 1781 - strong earthquake in Romagna, Marche and Tuscany

June 3, 1781 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Sunday, June 3, 1781 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Tuesday, September 1, 1925

1925-09-03	18:55	Monte Amiata
1925-09-05	07:42	Costa croata settentrionale
1925-09-10	10:33	Costa croata settentrionale

2 Settembre 1925 19:52:48 Luna Piena 09°47'49 362 835.66 km

10 Settembre 1925 00:11:26 Ultimo quarto 16°45'43 398 754.21 km

Sep 1, 1925 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Tuesday, September 1, 1925 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Sunday, September 12, 1943

The Tottori earthquake of September 10, 1943 (Japan), of magnitude 7.2, struck the Ketaka district of Tottori prefecture.

October 12, 1835 – very strong earthquake in Calabria citra

October 12, 1835 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Monday, October 12, 1835 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Thursday, January 10, 1980

1980-01-05	14:32	Torinese
1980-01-23	21	Monti Iblei
1980-01-25		Val Venosta

January 10, 1980 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Thursday, January 10, 1980 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Wednesday, January 21, 1998

1998-01-17	12:32	Golfo di Castellammare (Sicilia)
1998-01-26	23:17	Adriatico centrale

July 12, 1873 – Very strong earthquake in the Sora area (Lazio)

July 12, 1873 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Saturday, July 12, 1873 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Tuesday, October 10, 2017

2017-10-26	22:38	Vallo di Diano

July 26, 1805 – Earthquake in Terra di Lavoro and Sannio

July 26, 1805 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Friday, July 26, 1805 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Monday, October 24, 1949

21/10/1949	22.11	Eclisse parziale. Magnitud. = 0,96	Meridionale	6.29	17.20

1949-10-08	03:08	Sicilia sud-orientale
1949-10-27	19:08	Monti Reatini

October 24, 1949 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Monday, October 24, 1949 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Saturday, November 4, 1967

1967-10-31	21:08	Monti Nebrodi

August 14, 1846 - strong earthquake in Tuscany

Input interpretation

Friday, August 14, 1846 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Monday, November 12, 1990

1990-10-29	08:16	Stretto di Sicilia
1990-11-11	22:16	Slovenia occidentale

Nov 12, 1990 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Monday, November 12, 1990 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Sunday, November 23, 2008

2008-11-20	14:09	Ionio settentrionale
2008-11-28	23:39	Sicilia centrale

March 11-12, 1881 - strong earthquake in Umbria

March 12, 1881 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Saturday, March 12, 1881 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Tuesday, June 10, 2025

June 10, 2025 - 18 years 11 days 8 hours 42 minutes

Input interpretation

Tuesday, June 10, 2025 – 18 years 11 days 8 hours 42 minutes

Result

3:18 pm CEST | Tuesday, May 29, 2007

2007-05-19	16:19	Schoenwies
2007-05-25	09:39	Costa calabra settentrionale

March 5, 1823 - strong earthquake in Sicily

March 5, 1823 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Wednesday, March 5, 1823 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Saturday, June 3, 1967

1967-06-17	15:42	Gargano

Jun 3, 1967 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Saturday, June 3, 1967 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Friday, June 14, 1985

1985-06-13	21:18	Etna - Versante occidentale
1985-06-27	16:56	Stretto di Sicilia

November 1, 1755 – Lisbon Earthquake

November 1, 1755 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Saturday, November 1, 1755 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Tuesday, January 30, 1900

1900-01-29	04:22	Alanno

January 30, 1900 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Tuesday, January 30, 1900 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Sunday, February 10, 1918

1918-02-11	12:57	Appennino forlivese
1918-02-11	19:15	Appennino forlivese
1918-02-11	21:30	Appennino forlivese
1918-02-12	06:30	Appennino forlivese
1918-02-19	11:03	Costa croata settentrionale

March 28, 1787 – Mexico Earthquake – 8.6 Richter

March 28, 1787 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Wednesday, March 28, 1787 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Friday, June 26, 1931

1931-06-19		Casamicciola
1931-06-25	05:01	Senigallia

Junuary 26, 1931 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Monday, January 26, 1931 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Sunday, February 6, 1949

1949-02-03 22:29 Carnia

1 Saros cycle 18 years 11 days 8 hours 42 minutes

8 Saros cycles 144 years 90 days 21 hours 36 minutes

June 3, 1863, Manila Earthquake

June 3, 1863 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Wednesday, June 3, 1863 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Saturday, September 1, 2007

28 Agosto 2007 10:35:06 Luna Piena 04°45'34 368 615.18 km

2007-08-18	14:04	Golfo di Patti	Sicilia

1840 March 22 Philippine earthquake 6.5 R

March 22, 1840 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Sunday, March 22, 1840 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Wednesday, June 20, 1984

1984-06-17	16:51	Etna - S. Maria la Stella (Aci S.	
1984-06-19	01:27	Monti della Meta	
1984-06-19	15:19	Etna - Fiandaca (Acireale)	
1984-06-23		Sila Greca	(Calabria meridionale)

Jun 20, 1984 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Wednesday, June 20, 1984 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Monday, July 1, 2002

2002-07-08 08:12 Irpinia Mw = 4.06

What is the New Seismic Theory of the Tides by Prof. Giulio Grablovitz?

The Grablovitz Tidal-Seismic Theory has been studied in depth, and several connections between eclipse dates, Saros cycles and earthquakes have been obtained. As an example, we report the following calculation:

August 14, 1846 - strong earthquake in Tuscany.

13 Agosto 1846 22:51:27 Ultimo quarto 20°43'51 384950.14 km

21 Agosto 1846 23:25:47 Luna Nuova 28°27'21 406510.09 km

To this date, adding 8 Saros cycles, we obtain:

August 14, 1846 + 144 years 90 days 21 hours 36 minutes

Result: November 12, 1990 , date very close to the following seismic events

1990-10-29 08:16 Stretto di Sicilia

1990-11-11 22:16 Slovenia occidentale

and the following lunar phases:

2 Novembre 1990 21:48:17 Luna Piena 10°12'55 359659.75 km ;

9 Novembre 1990 13:01:47 Ultimo quarto 16°52'02 378912.90 km;

17 Novembre 1990 09:04:34 Luna Nuova 24°45'15 405502.78 km

Adding to this date 1 Saros cycle, we get:

Nov 12, 1990 + 18 years 11 days 8 hours 42 minutes

Result: November 23, 2008, date very close to the following seismic events

2008-11-20 14:09 Ionio settentrionale

2008-11-28 23:39 Sicilia centrale

and the following lunar phases:

19 Novembre 2008 21:30:43 Ultimo quarto 27°55'43 378308.53 km

27 Novembre 2008 16:54:35 Luna Nuova 05°49'28 405119.41 km

This eclipse

21/10/1949	22.11	Eclisse parziale. Magnitud. = 0,96	Meridionale	6.29	17.20

is connected to the following earthquakes:

1949-10-08	03:08	Sicilia sud-orientale
1949-10-27	19:08	Monti Reatini

7 Ottobre 1949 02:52:34 Luna Piena 13°30'25 406199.66 km

21 Ottobre 1949 21:22:47 Luna Nuova 28°08'46 357173.26 km

28 Ottobre 1949 17:04:15 Primo quarto 04°56'55 389614.11 km

To this date, adding a Saros cycle, we get: 04.11.1967, a date very close to the following earthquake:

1967-10-31	21:08	Monti Nebrodi

2 Novembre 1967 05:48:19 Luna Nuova 09°06'59 356 995.06 km

and the following eclipse:

02/11/1967	6.36	Eclisse parziale. Magnitud. = 1,01	Meridionale	6.43	17.04

05/04/1837 8.42 Eclisse parziale. Magnitud. = 0,07 Meridionale 5.47 18.40

April 11-12, 1837 – Very strong earthquake in Lunigiana!!! (Fr. Giuseppe Mercalli)

5 Aprile 1837 07:20:04 Luna Nuova 15°18'09 373907.24 km

16/05/1855	3.05	Eclisse parziale. Magnitud. = 0,76	Settentrionale	4.49	19.23

1-27 May 1855 – strong eruption of Vesuvius

16 Maggio 1855 02:13:18 Luna Nuova 24°37'28 383641.59 km

26/07/1805	7.13	Eclisse parziale. Magnitud. = 0,14	Meridionale	4.57	19.35

July 26, 1805 – Earthquake in Terra di Lavoro and Sannio

26 Luglio 1805 06:28:26 Luna Nuova 02°44'14 360 681.24 km

21/10/1949	22.11	Eclisse parziale. Magnitud. = 0,96	Meridionale	6.29	17.20

1949-10-08	03:08	Sicilia sud-orientale
1949-10-27	19:08	Monti Reatini

02/11/1967	6.36	Eclisse parziale. Magnitud. = 1,01	Meridionale	6.43	17.04

1967-10-31	21:08	Monti Nebrodi

04/03/1840	4.58	Eclisse anulare.	Settentrionale	6.41	18.04

Mercoledi 18 Marzo 1840 04:31:18 Luna Piena 27°40'43 391 673.22 km

1840 March 22 - Philippine earthquake 6.5 R

Several earthquake dates, precisely 9, are also connected with dates of partial and annular eclipses. The most interesting is that of the earthquake of July 26, 1805 in Terra di Lavoro and Sannio.

This date coincides perfectly with the eclipse of July 26, 1805. Adding 8 Saros cycles, we get October 24, 1949, a date very close to the eclipse of October 21, 1949 and to the following earthquakes: 1949-10-08 03:08 South-eastern Sicily 1949-10-27 19:08 Monti Reatini. To this date, adding a Saros cycle, we get: 11.04.1967, a date very close

to the following earthquake: 1967-10-31 21:08 Monti Nebrodi and to the following eclipse:

02/11/1967 6.36 Eclisse parziale. Magnitud. = 1,01 Meridionale 6.43 17.04

Analysis of further earthquakes

Regarding the strong earthquake of Bellunese (**PIEDMONT**) of 06.29.1873, we have the following lunar phase:

24 Giugno 1873 21:12:32 Luna Nuova 03°19'52 392 935.27 km

and the following calculations:

June 29, 1873 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Sunday, June 29, 1873 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Wednesday, September 27, 2017

2017-09-18 07:21 Etna (**SICILIA**) - Versante sud-occidentale

20 Settembre 2017 05:29:52 Luna Nuova 27°27'05 382 736.30 km

The 2017 Puebla earthquake was an earthquake that struck central **MEXICO**, specifically the states of Puebla, Morelos and the capital Mexico City. The main shock occurred on Tuesday, September 19, 2017 at 13:14:40 local time (UTC-5) with a magnitude of 7.1 Mww and lasted about 120 seconds. The epicenter was located in Morelos, about 55 km south of the city of Puebla and at a depth of 51 km

Magnitude 6.0 earthquake off the coast of **PAPUA NEW GUINEA** No tsunami warning issued Tweet September 25, 2017 A magnitude 6.0 earthquake was recorded 230 km off the coast of the New Britain region, along the coast of Papua New Guinea. The hypocenter was located at a depth of 5.7 km. This was reported by the US Geological Observatory Usgs - See more at: http://www.rainews.it/archivio-rainews/articoli/Terremoto-di-magnitudo-6-al-largo-di-Papua-Nuova-Guinea-18be0efa-a73a-4730-8c46-45d1632b9b19.html

Regarding the earthquake of 04.27.1879 and 06.22.1879 respectively in the Tuscan-Emilian Apennines and in Friuli, we note that on 07.01.1879 there was an earthquake in the Philippines of the 10th Mercalli and that adding 8 Saros cycles to the date of 06.22.1879, we have:

Moon Phases April 1879

21 Aprile	1879	13:55:41	Luna Nuova	01°04'38	406673.04 km
29 Aprile	1879	14:16:33	Primo quarto	08°52'28	383731.80 km
3 Luglio	1879	21:38:03	Luna Piena	11°30'59	369165.43 km

19/07/1879	10.01	Eclisse anulare.	Meridionale	4.51	19.41

FRIULI

June 22, 1879 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Sunday, June 22, 1879 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Wednesday, September 20, 2023

The 2023 Marrakesh-Safi earthquake was a seismic event that occurred on the night of September 8, 2023, that struck the Marrakesh-Safi region of Morocco along the Atlas mountain range

MOROCCO

Two strong earthquakes were recorded today, September 8, 2023, on the coast of the western state of Jalisco, in **MEXICO**. According to USGS data, a first shock of magnitude 5.6 occurred at 9:53 local time (17:53 in Italy) with an epicenter 9 km northwest of Emiliano Zapata, very close to the coast, and at a depth of 35 km. The epicenter of the second shock of magnitude 5.8, which occurred at 18:37 Italian time,

was located 4 km northeast of Emiliano Zapata, while the hypocenter was located at a depth of 54 km.

15 Settembre 2023 01:39:48 Luna Nuova 21°58'42 404203.97 km

Tuesday 12 September 2023, 21:39 - Last update 13 September, 16:17

A violent earthquake of magnitude 6.3 was recorded at sea about seventy kilometers north of the northern island of Luzon, in the **PHILIPPINES**, by the global service of the Usgs, the US geoseismic institute.

Earthquake in Slovenia felt in Friuli: five tremors in a few minutes, the strongest of magnitude 3.6

19 sept 2023 — Earthquake of magnitude ML 2.1 on September 19, 2023 at 16:06:50 (Italy Time Zone) in the area: **SOUTHERN TYRRHENIAN SEA** (SEA)

29 Settembre 2023 09:57:32 Luna Piena 06°00'24 361553.82 km

On **Thursday 28 September 2023** at 00:49 an earthquake of magnitude 3.2 and depth 454.4 km was recorded in **TIRRENO MERIDIONALE** (MARE). Further information on the INGV page by clicking here.

Regarding the other date (**TUSCAN-EMILIAN APENNINES**), adding 8 Saros cycles, we obtain:

April 27, 1879 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Sunday, April 27, 1879 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Wednesday, July 26, 2023

An earthquake of magnitude ML 4.3 was recorded by the stations of the National Seismic Network at 19:34 Italian time today, July 29, 2023. The epicenter was located on the border between **SLOVENIA** and **CROATIA**, 48 km from San Dorligo della Valle-Dolina (TS), 55 km from Muggia (TS), 56 km from Trieste (TS), with a hypocenter at a depth of about 5 km.

An earthquake of magnitude 6.4 was recorded in **MEXICO**, with epicenter on the coast of Chiapas on 07.14.2023

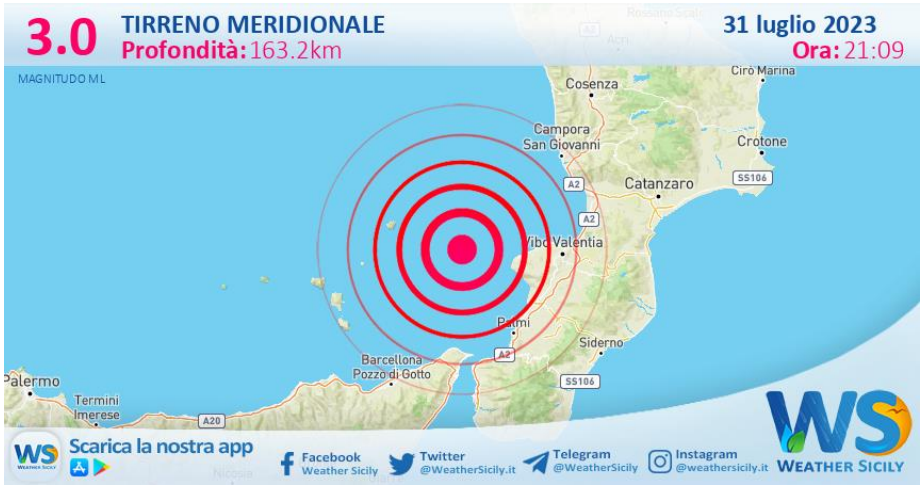
17 Luglio 2023 18:31:50 Luna Nuova 24°56'09 403 968.54 km

Earthquake with magnitude 4.4 felt at 19:26 on July 24, 2023.

Location: Mindanao, **PHILIPPINES.**

25 Luglio 2023 22:06:47 Primo quarto 02°43'00 391099.20 km

1 Agosto 2023 18:31:40 Luna Piena 09°15'48 357528.34 km



31.07.2023 Strong earthquake in the **SOUTHERN TYRRHENIAN SEA**

The 1873 San Ginesio earthquake, cited in scientific literature as the **SOUTHERN MARCHE** earthquake, was an earthquake that occurred on 12 March 1873 in the Morello di San Ginesio area, in the province of Macerata.

14 Marzo 1873 05:44:38 Luna Piena 23°44'34 403 114.74 km

Adding 8 Saros cycles to that date, we get:

March 12, 1873 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Wednesday, March 12, 1873 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CEST | Saturday, June 10, 2017

Earthquake today/ Ingv, latest tremors: 2.6M earthquake in the **SOUTHERN TYRRHENIAN SEA** (June 5, 2017, 9:00 am). Earthquake today, latest tremor

yesterday in the world: 3.2M earthquake in Chile. Temperatures falling and bad weather in most of Italy due to a temporary disturbance

2017-06-09 12:15 Aquilano (**ABRUZZO**)

A few minutes into this new day, Sunday 18 June 2017, international seismographs located a major earthquake that hit the **FIJI ISLANDS**. The power of the earthquake was 5.4M, detected at 00.26 and at latitude 24.05 and longitude 179.52, hypocentre at a depth of 519 km. At 23.27, **INDONESIA** was hit by an earthquake of 4.2M, located south of Sumatra, at latitude 3.17 and longitude 101.20. The hypocentre was detected at a depth of 17 km. The situation is calm in Italy, where the last shock, equal to 2.2M, was detected at 22.53 in the province of Rieti. The National Earthquake Center has identified the epicenter at latitude 42.60 and longitude 13.22, hypocenter at a depth of 11 km. Involved Cittareale, Amatrice, Montereale, Accumoli, Capitignano, Borbona, Posta, Campotosto, Cagnano Amiterno, Barete and Pizzoli.

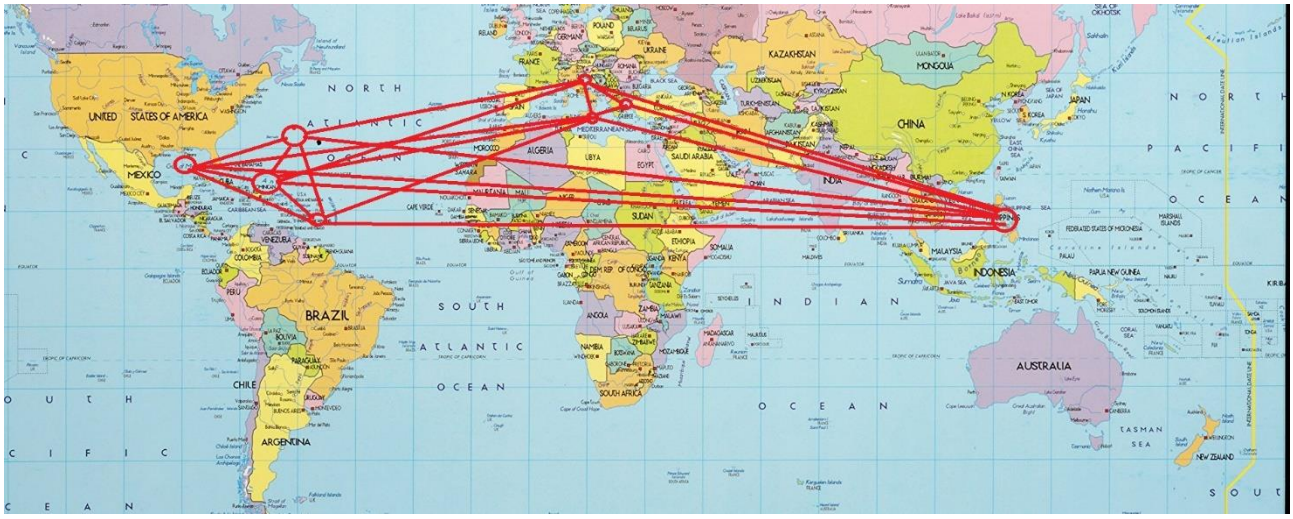
An earthquake measuring 6.9 on the Richter scale was recorded yesterday, Wednesday 14 June 2017, with epicenter in the region of San Marcos, west of **GUATEMALA**, near the border with the Mexican state of Chiapas.

Earthquake in Guatemala Photo: Russia Today

The United States Geological Survey (USGS) reported that an earthquake measuring 6.9 on the Richter scale was recorded yesterday, Wednesday 14, with its epicenter in the region of San Marcos, west of Guatemala, near the border with the Mexican state of Chiapas.

The epicenter of the earthquake was located three kilometers from the town of San Pablo, Guatemala, and the hypocenter at a depth of 98 kilometers, the multi-state chain Telesur reported.

1 Giugno	2017	12:42:07	Primo quarto	11°12'47	385 120.37 km
9 Giugno	2017	13:09:35	Luna Piena	18°53'15	406 271.65 km
17 Giugno	2017	11:32:43	Ultimo quarto	26°27'56	381 487.31 km
24 Giugno	2017	02:30:42	Luna Nuova	02°47'18	358 341.17 km



Seismic radians as per the Mareo-seismic theory of Giulio Grablovitz (Fig. 1)

Antille – Golfo del Messico-Santa Lucia – Mar dei Sargassi - Lisbona – Trieste-Venezia-Etna – Grecia (Eubea) - Filippine

Seismic radians as per the Mareo-seismic Theory of Giulio Grablovitz (Updated to September 1, 2024, by Nardelli Prof. Michele) (Fig. 3)

Messico-Guatemala; Marocco-Italia; Filippine-Indonesia-Papua Nuova Guinea-Fiji

Earthquakes in the world 08.17.2024

5.0 551.4 Km Suva (Fiji) -23.1385 179.3199 17-08-2024 23:50

5.0 336.5 Km Tiakur (Indonesia) -6.6547 128.0267 17-08-2024 23:10

5.0 320.0 Km Tiakur (Indonesia) -6.6800 128.0400 17-08-2024 22:52

5.1 35.0 Km Petropavlovsk-Kamchatsky 52.9896 160.1884 17-08-2024 22:24

5.1 30.0 Km Petropavlovsk-Kamchatsky 52.9000 160.0800 17-08-2024 21:40

7.0 29.0 Km Petropavlovsk-Kamchatsky 52.7320 160.0850 17-08-2024 21:23

5.9 30.0 Km Petropavlovsk-Kamchatsky 52.8700 160.2100 17-08-2024 21:10

4.0 17.0 Km Ákra Agías Pelagías (Grecia) 37.7500 19.9200 17-08-2024 20:32

4.7 10.0 Km Yilan (Taiwan) 24.3741 121.9141 17-08-2024 15:52

4.6 213.6 Km Kimbe (Papua-Nuova Guinea) -5.0721 150.6495 17-08-2024 14:14

5.2 614.6 Km Levuka (Fiji) -20.8979 -179.1374 17-08-2024 13:54

4.3 234.0 Km Kimbe (Papua-Nuova Guinea) -5.0900 150.7200 17-08-2024 13:22

4.6 39.1 Km Vintar (Filippine) 18.3844 120.7571 17-08-2024 12:53

5.2 10.0 Km Hachijojima Airport (Giappone) 32.4651 142.3967 17-08-2024 08:51

4.3 62.0 Km Napier (Nuova Zelanda) -39.1900 176.5100 17-08-2024 06:52

5.7 113.0 Km Nuku‘alofa (Tonga) -21.8523 -176.2293 17-08-2024 05:51

5.3 140.0 Km 'Ohonua (Tonga) -21.8900 -175.4200 17-08-2024 05:29

5.2 169.1 Km Yelizovo (Russia) 53.5272 158.2732 17-08-2024 04:22

5.2 168.0 Km Yelizovo (Russia) 53.5400 158.1900 17-08-2024 04:00

4.2 9.0 Km Saumlaki (Indonesia) -7.0100 129.8700 17-08-2024 02:55

4.8 53.0 Km Onagawa Ch? (Giappone) 38.5728 141.8918 17-08-2024 02:50

4.9 52.0 Km Onagawa Ch? (Giappone) 38.4700 142.0200 17-08-2024 02:33

4.9 35.0 Km Claveria (Filippine) 19.2633 121.1679 17-08-2024 02:25

4.4 9.0 Km Claveria (Filippine) 19.0100 121.4200 17-08-2024 01:56

Earthquakes in Italy 08.17.2024

2024-08-17 23:33:32	Md 2.6	Campi Flegrei
2024-08-17 22:02:28	ML 2.0	4 km SE Montalbano Elicona (ME)
2024-08-17 21:10:27	**Mwp 7.0**	**Off east coast of Kamchatka Peninsula, Russia [Sea: Russia]**
2024-08-17 19:18:35	ML 2.4	Tirreno Meridionale (MARE)
2024-08-17 16:15:11	Md 2.0	Campi Flegrei
2024-08-17 14:52:44	Md 2.3	Campi Flegrei
2024-08-17 05:23:00	ML 2.1	3 km S Calice al Cornoviglio (SP)

2024-08-17 02:43:42	ML 2.5	4 km SE Calice al Cornoviglio (SP)
2024-08-17 00:18:45	ML 2.5	Canale di Sicilia meridionale (MARE)

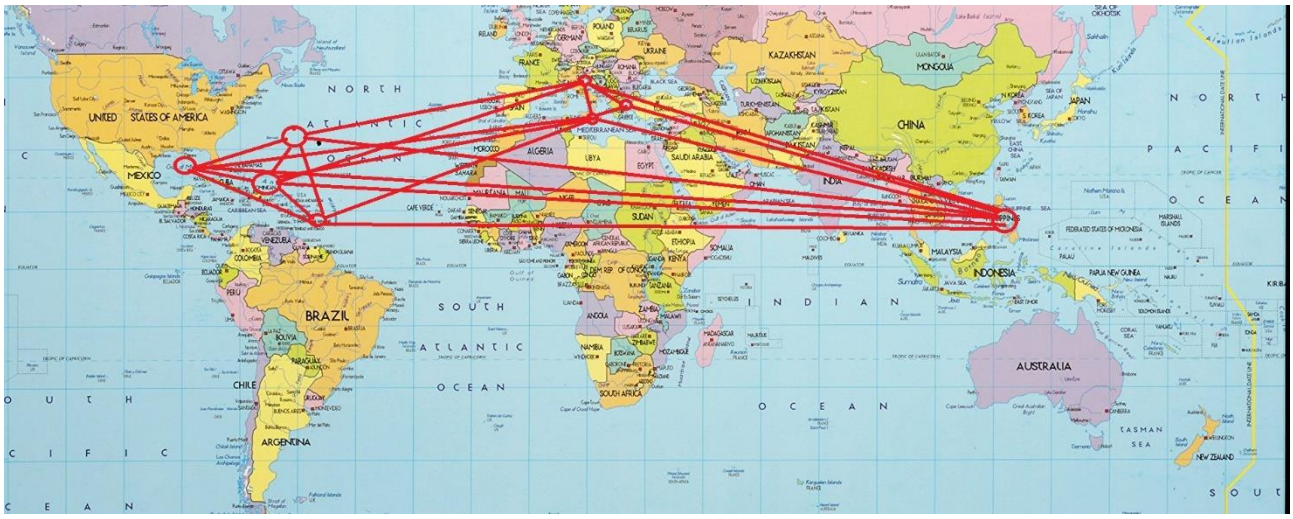
August 17 01:24 Earthquake in Mexico

On August 17, 2024, seismic events occurred in the following locations:

Filippine-Giappone-Indonesia-Kamčatka (Russia)-Oceania (Fiji, Tonga)-Nuova Zelanda-Giappone-Filippine-Papua Nuova Guinea-Oceania-Papua Nuova Guinea-Taiwan-Messico-Grecia- Kamčatka (Russia)-Indonesia-Oceania (Fiji, Tonga)

Canale di Sicilia Meridionale-Calice al Cornoviglio (La Spezia)-Campi Flegrei-Tirreno Meridionale (in mare, tra la Calabria e le isole Eolie)-Montalbano Elicona (Messina)-Campi Flegrei

Seismic events map August 17, 2024 (Fig. 3)



(Fig. 1 compared with Fig. 3)

The four fundamental “Radians” of the Mareo-seismic Theory of Prof. Giulio Grablovitz

The “tour” of earthquakes was:

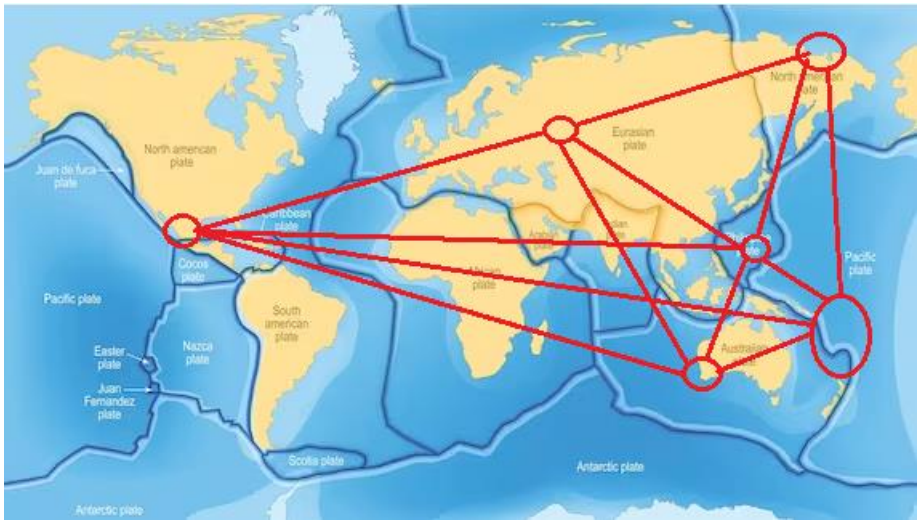
Sicilia meridionale – Messico - Filippine – Giappone - Liguria – Indonesia - Kamčatka (Russia)- Liguria – Oceania – Nuova Zelanda – Giappone – Filippine – P. Nuova Guinea – Oceania – P. Nuova Guinea – Campi Flegrei – Taiwan – Campi Flegrei - Tirreno Meridionale - Grecia - Kamčatka (Russia)- Sicilia - Kamčatka (Russia)- Indonesia – Campi Flegrei - Oceania

That is to say:

Italia –Messico - Filippine – Giappone - Italia – Indonesia - Kamčatka (Russia)- Italia – Oceania – Nuova Zelanda – Giappone – Filippine – P. Nuova Guinea – Oceania – P. Nuova Guinea – Italia – Taiwan – Italia - Grecia - Kamčatka (Russia)- Italia - Kamčatka (Russia)- Indonesia – Italia - Oceania

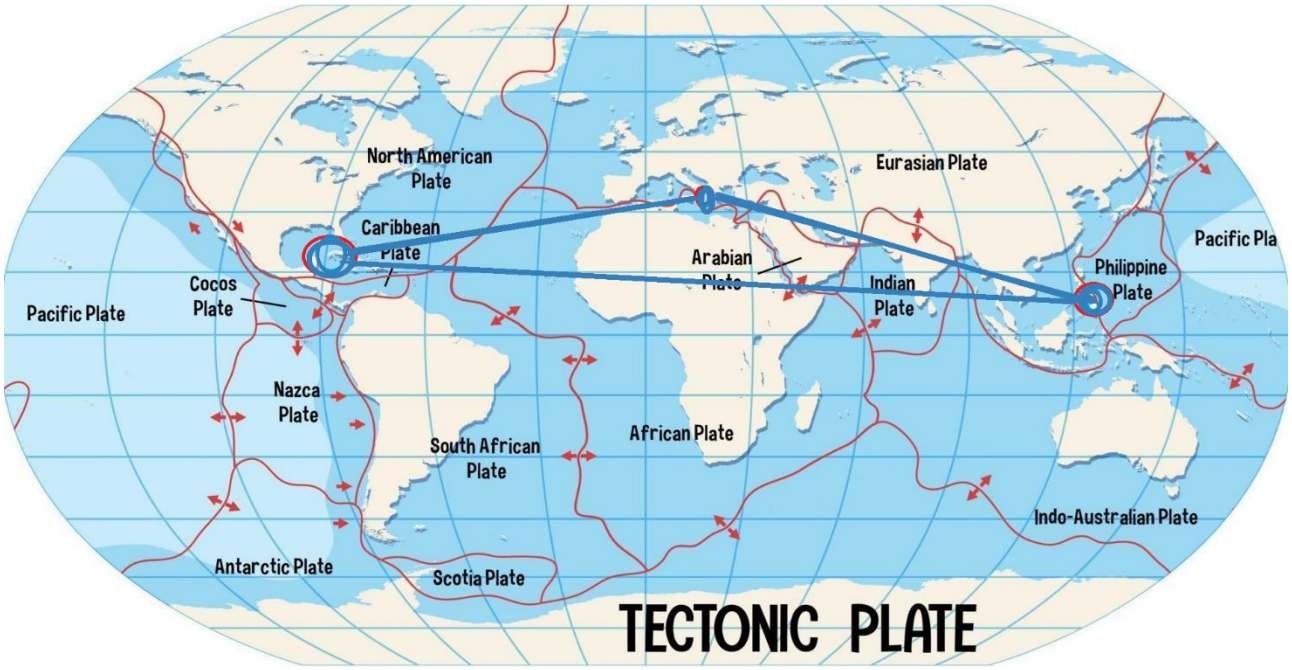
As far as the plates are concerned, there was the following “round”:

Placca euroasiatica – (Placca nord-americana – Placca di Cocos – Placca caraibica) – Placca Filippine - Placca euroasiatica – Placca nord-americana - Placca euroasiatica – Placca australiana – Placca pacifica - Placca euroasiatica - Placca Filippine - Placca australiana - Placca pacifica - Placca euroasiatica - Placca nord-americana - Placca euroasiatica - Placca nord-americana - Placca euroasiatica - Placca australiana - Placca pacifica



The rotation of the continental plates was, regarding the earthquakes that occurred on August 17, 2024, as follows

Placca euroasiatica – (Placca nord-americana – Placca di Cocos – Placca caraibica) – Placca Filippine – Placca australiana – Placca pacifica



Fundamental **seismic radians** of the Tidal-Seismic Theory of Prof. Giulio Grablovitz. The figure also highlights the plates on which the aforementioned **seismic radians** "rest"

MAREA DELLE ANTILLE

Località	Ore	Osservazioni
AFRICA		
Isola del Nord (presso Sherboro)	5ʰ 56′	Sotto la parziale influenza della marea *oceanica*.
Capo della Sierra Leone	7 46	
Riviera di Ponga	7 24	
„ „ Nunez	10 —	
Gambia	8 —	
Isola Factory	*6 55	Le ore segnate con asterisco si riferiscono generalmente ad isole e sono perciò in anticipazione rispetto alle coste vicine, a misura della rispettiva distanza dal punto radiante.
„ Gorea	*7 46	
Capo Verde	7 40	
Isola Santiago	*6 —	
„ S. Nicolao	*7 —	
Senegal	(5 12)	Le ore tra parentesi si riferiscono a località non esposte al mare aperto, per cui non sono atte a dar norma esatta.
Capo Bianco	10 40	
Riviera d'Ouro	12 —	
Capo Bojador	12 14	
Mogador	13 20	
Isola Madera (Funchal)	*13 —	
„ Fayal (Azzorre)	*12 —	Il salto di circa 12 ore corrisponde a mezza giornata lunare.
Ceuta (nel Mediterraneo)	(2 19)	

Let's add up the various hours:

5.56hours + 7.46hours + 7.24hours + 10hours + 8hours + 6.55hours + 7.46hours + 7.40hours + 6hours

Result

65.67 hours

Unit conversions

2 days 17 hours 40 minutes

---

65 hours 40 minutes

236 400 seconds

3940 minutes

2.736 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

7.087×10^{10} km (kilometers)

7.087×10^{13} meters

474 au (astronomical units)

44.04 billion miles

Frequency ν from $\nu = 1/T$:

4.2×10^{-6} Hz (hertz)

(65.67 hours+7hours + 5.12hours + 10.40hours + 12hours + 12.14hours + 13.20hours + 13hours + 12hours + 2.19hours)

Input interpretation

65.67 hours + 7 hours + 5.12 hours + 10.4 hours + 12 hours +
12.14 hours + 13.2 hours + 13 hours + 12 hours + 2.19 hours

Result

152.72 hours

Unit conversions

6 days 8 hours 43 minutes 12 seconds

---

152 hours 43 minutes 12 seconds

---

549 790 seconds

9163 minutes

6.3633 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.648×10^{11} km (kilometers)

1.648×10^{14} meters

1102 au (astronomical units)

102.4 billion miles

Frequency ν from $\nu = 1/T$:

1.8×10^{-6} Hz (hertz)

From which:

(152.72)^1/10

Input interpretation

$\sqrt[10]{152.72}$

Result

1.653444384639451566045367295803198043433963013319298026646578519 5

…

1.653444384…. result very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164.2696$ i.e. 1.6557845...

11(152.72)+7^2

Input interpretation

$11 \times 152.72 + 7^2$

Result

1728.92

1728.92

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string.

This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(11(152.72)+7^2)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\sqrt[15]{11\times 152.72+7^2}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.64493295345133589110349853129647152452816975845379567195851325 37
…

1.64493295345…. ≈ $\zeta(2) = \pi^2/6 = 1.644934$ (trace of the instanton shape and Ramanujan Recurring Number)

(1/27(((11(152.72)+7^2)-1)))^2+1/Pi

Input interpretation

$$\left(\frac{1}{27}\left(\left(11\times 152.72+7^2\right)-1\right)\right)^2+\frac{1}{\pi}$$

Result

4095.94…

4095.94…. ≈ 4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry.

Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternative representations

$$\left(\frac{1}{27}\left((11\times 152.72+7^2)-1\right)\right)^2+\frac{1}{\pi}=\frac{1}{180^\circ}+\left(\frac{1}{27}\left(1678.92+7^2\right)\right)^2$$

$$\left(\frac{1}{27}\left((11\times 152.72+7^2)-1\right)\right)^2+\frac{1}{\pi}=-\frac{1}{i\log(-1)}+\left(\frac{1}{27}\left(1678.92+7^2\right)\right)^2$$

$$\left(\frac{1}{27}\left((11\times 152.72+7^2)-1\right)\right)^2+\frac{1}{\pi}=\frac{1}{\cos^{-1}(-1)}+\left(\frac{1}{27}\left(1678.92+7^2\right)\right)^2$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\left(\frac{1}{27}\left((11\times 152.72+7^2)-1\right)\right)^2+\frac{1}{\pi}=4095.62+\frac{1}{4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\left(\frac{1}{27}\left((11\times 152.72+7^2)-1\right)\right)^2+\frac{1}{\pi}=4095.62+\frac{1}{-2+2\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\left(\frac{1}{27}\left(\left(11\times 152.72+7^2\right)-1\right)\right)^2+\frac{1}{\pi}=4095.62+\frac{1}{\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50\,k)}{\binom{3\,k}{k}}}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\left(\frac{1}{27}\left(\left(11\times 152.72+7^2\right)-1\right)\right)^2+\frac{1}{\pi}=4095.62+\frac{1}{2\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\left(\frac{1}{27}\left(\left(11\times 152.72+7^2\right)-1\right)\right)^2+\frac{1}{\pi}=4095.62+\frac{1}{4\int_0^1\sqrt{1-t^2}\,dt}$$

$$\left(\frac{1}{27}\left(\left(11\times 152.72+7^2\right)-1\right)\right)^2+\frac{1}{\pi}=4095.62+\frac{1}{2\int_0^{\infty}\frac{\sin(t)}{t}\,dt}$$

EUROPA

Costa occidentale iberica.

Algesiras (Mediterraneo)	(2ʰ 3′)
Cadice	1 26
Porto della Caraca	1 38
Pera-Algarve	1 56
Baia di Lagos	2 26
Sines	2 21
Cascaes (Tago)	1 46
Paço d'Arcos	2 16
Lisbona (arsenale)	(2 46)
Peniche	2 26
Oporto	2 46
Camarinas	2 46

(2.3 hours+1.26hours + 1.38hours + 1.56hours + 2.26hours + 2.21hours + 1.46hours + 2.16hours + 2.46hours + 2.26hours + 2.46hours + 2.46hours)

Input interpretation

2.3 hours + 1.26 hours + 1.38 hours + 1.56 hours + 2.26 hours + 2.21 hours + 1.46 hours + 2.16 hours + 2.46 hours + 2.26 hours + 2.46 hours + 2.46 hours

Result

24.23 hours

Unit conversions

1 day 13 minutes 50 seconds

---

24 hours 13 minutes 50 seconds

87 200 seconds

1454 minutes

1.01 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

2.615×10^{10} km (kilometers)

2.615×10^{13} meters

175 au (astronomical units)

16.25 billion miles

Frequency ν from $\nu = 1/T$:

1.1×10^{-5} Hz (hertz)

Costa iberica settentrionale.

Ferrol	2	56
Santander	3	46
Bilbao	3	16
San Sebastiano	3	26

24.23 hours + 2.56hours + 3.46hours + 3.16hours + 3.26hours

Input interpretation

24.23 hours + 2.56 hours + 3.46 hours + 3.16 hours + 3.26 hours

Result

36.67 hours

Unit conversions

1 day 12 hours 40 minutes

---

36 hours 40 minutes

---

132 010 seconds

2200 minutes

1.528 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

3.958×10^{10} km (kilometers)

3.958×10^{13} meters

265 au (astronomical units)

24.59 billion miles

Frequency ν from $\nu = 1/T$:

7.6×10^{-6} Hz (hertz)

From which:

121(36.67)-322-11-8

Input

$121 \times 36.67 - 322 - 11 - 8$

Result

4096.07

4096.07 ≈ 4096

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This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

27*sqrt(121(36.67)-322-11-8)+1

Input

$$27\sqrt{121\times 36.67-322-11-8}+1$$

Result

1729.01…

1729.01….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron.

As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(27*sqrt(121(36.67)-322-11-8)+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{27\sqrt{121\times 36.67-322-11-8}+1}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.64493895999911727052390410304730498468482307719020382190709186 00
...

1.644938959…. ≈ $\zeta(2) = \pi^2/6 = 1.644934$ (trace of the instanton shape and Ramanujan Recurring Number)

Costa francese occidentale.

Località	Ore	Altezze
Boucaut (Adour)	3h 53'	M. 1.40
Cordouan (Gironda)	3 53	„ 2.35
La Rochelle	3 31	„ 2.67
S. Nazaire (Loira)	3 47	„ 2.68
Le Croisic.	3 42	„ 2.50
Port Louis (Lorient)	3 24	„ 2.35
Lorient	3 32	„ 2.24
Audierne	3 31	„ 2.—
Brest	3 46	„ 3.21

(3.53h + 3.53h + 3.31h + 3.47h + 3.42h + 3.24h + 3.32h + 3.31h + 3.46h)

Input interpretation

3.53 hours + 3.53 hours + 3.31 hours + 3.47 hours +
3.42 hours + 3.24 hours + 3.32 hours + 3.31 hours + 3.46 hours

Result

30.59 hours

Unit conversions

1 day 6 hours 35 minutes 24 seconds

---

30 hours 35 minutes 24 seconds

---

110 100 seconds

1835 minutes

1.275 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

- 3.301×10^{10} km (kilometers)
- 3.301×10^{13} meters
- 221 au (astronomical units)
- 20.51 billion miles

Frequency ν from $\nu = 1/T$:

- 9.1×10^{-6} Hz (hertz)

Costa francese settentrionale.

Morlaix	5 15	„	?
S. Malò	6 10	„	5.68
Jersey (isola)	6 25	„	?
Guernesey (isola)	6 28	„	?
Granville	6 23	„	6.15
Cherbourg	7 58	„	2.82
Barfleur	8 55	„	2.82
La Hougue	8 48	„	3.04
Port en Bessin	9 8	„	3.20
Entrée de l'Orne	9 8	„	3.65

(5.15hours+6.10hours+6.25hours+6.28hours+6.23hours+7.58hours+8.55hours+8.48hours+9.8hours+9.8hours)

Input interpretation

5.15 hours + 6.1 hours + 6.25 hours + 6.28 hours + 6.23 hours +
7.58 hours + 8.55 hours + 8.48 hours + 9.8 hours + 9.8 hours

Result

74.2 hours

Unit conversions

3 days 2 hours 13 minutes

---

267 200 seconds

4450 minutes

3.09 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

8.01×10^{10} km (kilometers)

8.01×10^{13} meters

535 au (astronomical units)

49.77 billion miles

Frequency ν from $\nu = 1/T$:

3.7×10^{-6} Hz (hertz)

We obtain:

(30.59hours+74.2 hours)

Input interpretation

30.59 hours + 74.2 hours

Result

104.79 hours

Unit conversions

4 days 8 hours 47 minutes 24 seconds

104 hours 47 minutes 24 seconds

377 200 seconds

6287 minutes

4.366 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.131×10^{11} km (kilometers)

1.131×10^{14} meters

756 au (astronomical units)

70.27 billion miles

Frequency ν from $\nu = 1/T$:

2.7×10^{-6} Hz (hertz)

From which:

(17(30.59+74.2)-55+3)-2/5

Input

$$(17\,(30.59 + 74.2) - 55 + 3) - \frac{2}{5}$$

Result

1729.03

1729.03

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

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(1/27(((17(30.59+74.2)-55+3)-2/5)-1))^2-4/5*MRB const

Input

$$\left(\frac{1}{27}\left(\left((17\,(30.59+74.2)-55+3)-\frac{2}{5}\right)-1\right)\right)^2-\frac{4}{5}\,C_{\text{MRB}}$$

C_{MRB} is the MRB constant

Result

4095.99…

4095.99…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson.

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((17(30.59+74.2)-55+3)-2/5)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{(17\,(30.59+74.2)-55+3)-\frac{2}{5}}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.64493992557840213508637671641473944406689492743583102820263177 83

…

1.6449399255784…. ≈ $\zeta(2) = \pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Honfleur	9h	30′	M.	?
Le Hâvre de Grace	9	18	„	3.57
Fécamp	10	44	„	3.86
Dieppe	11	8	„	4.40
Cayeux (Somme)	11	13	„	4.58
Boulogne	11	26	„	3.96
Calais	11	49	„	3.12
Dunkerque	12	13	„	2.68

(9.15 hours + 10.44 hours + 11.8 hours + 11.13 hours + 11.26 hours + 11.49 hours + 12.13 hours)

Input interpretation

9.15 hours + 10.44 hours + 11.8 hours +
11.13 hours + 11.26 hours + 11.49 hours + 12.13 hours

Result

77.4 hours

Unit conversions

3 days 5 hours 24 minutes

---

77 hours 24 minutes

---

278 640 seconds

4644 minutes

3.225 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

8.353×10^{10} km (kilometers)

8.353×10^{13} meters

558 au (astronomical units)

51.91 billion miles

Frequency ν from $\nu = 1/T$:

3.6×10^{-6} Hz (hertz)

From which:

1/47((77.4)-√2)

Input

$$\frac{1}{47}\left(77.4 - \sqrt{2}\right)$$

Result

1.616718860375040530876559814378517062158092087757937275038794048 1

…

1.616718860375…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

AMERICA SETTENTRIONALE

Mare delle Antille

La Trinità	4h 26′
S. Lucia	6 40
Porto Rico (S. Giovanni)	8 16
Capo Haiti	6 —
Is. Thompson	10 23

Oceano Atlantico

Le Bermude	7 14
S. Agostino	8 34
Savannah	8 39
Charlestown	7 50
Capo Fear	7 44
„ Hatteras	6 13
Gosport	9 30
Delaware Breakwater	8h 5′
Sandy Hook	8 5
Old Point Comfort	8 57
New York	9 —
Newport	8 10
Warren	8 35
Gardiner's Bay	10 25
Nautucket	13 —
Cap Cod	12 —
Province Town	12 —
Boston	11 40
Glouchester	12 29
Portsmouth	12 —
Portland	11 40
Ile Mount Desert	11 40
Portmaine	11 43
S. Pietro e Miquelon	8 35

(4.26hours + 6.40hours + 8.16hours +6hours+10.23hours)

Input interpretation

4.26 hours + 6.4 hours + 8.16 hours + 6 hours + 10.23 hours

Result

35.05 hours

Unit conversions

1 day 11 hours 3 minutes

---

35 hours 3 minutes

---

126 180 seconds

2103 minutes

1.46 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

3.783×10^{10} km (kilometers)

3.783×10^{13} meters

253 au (astronomical units)

23.51 billion miles

Frequency ν from $\nu = 1/T$:

7.9×10^{-6} Hz (hertz)

(7.14hours+8.34hours+8.39hours+7.50hours+7.44hours+6.13hours+9.30hours+8.5hours+8.5hours+8.57hours+9hours+8.10hours+8.35hours)

Input interpretation

7.14 hours + 8.34 hours + 8.39 hours + 7.5 hours + 7.44 hours + 6.13 hours +
9.3 hours + 8.5 hours + 8.5 hours + 8.57 hours + 9 hours + 8.1 hours + 8.35 hours

Result

105.3 hours

Gardiner's Bay	10	25
Nautucket	13	—
Cap Cod	12	—
Province Town	12	—
Boston	11	40
Glouchester	12	29
Portsmouth	12	—
Portland	11	40
Ile Mount Desert	11	40
Portmaine	11	43
S. Pietro e Miquelon	8	35

(10.25hours+13hours+12hours+12hours+11.40hours+12.29hours+12hours+11.40hours+11.40hours+11.43hours+8.35hours)

Input interpretation

10.25 hours + 13 hours + 12 hours + 12 hours + 11.4 hours + 12.29 hours + 12 hours + 11.4 hours + 11.4 hours + 11.43 hours + 8.35 hours

Result

125.52 hours

We obtain, thus:

(35.05hours+105.3hours+125.52 hours)

Input interpretation

35.05 hours + 105.3 hours + 125.52 hours

Result

265.9 hours

Unit conversions

11 days 1 hour 50 minutes

---

265 hours 50 minutes

---

957 100 seconds

---

15 952 minutes

11.08 days

Interpretations

time

half-life

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

2.869×10^{11} km (kilometers)

2.869×10^{14} meters

1918 au (astronomical units)

178.3 billion miles

Frequency ν from $\nu = 1/T$:

1×10^{-6} Hz (hertz)

From which, after some calculations:

108*sqrt(35.05+105.3+125.52)-2^5

Input interpretation

$108\sqrt{35.05 + 105.3 + 125.52} - 2^5$

Result

1729.00…

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

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(108*sqrt(35.05+105.3+125.52)-2^5)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\sqrt[15]{108\sqrt{35.05+105.3+125.52}-2^5}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.64493778442225932234097483050244990823025816673211544302344854 56

…

1.6449377844…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

(1/27((108*sqrt(35.05+105.3+125.52)-2^5)-1))^2

Input interpretation

$$\left(\frac{1}{27}\left(\left(108\sqrt{35.05+105.3+125.52}-2^5\right)-1\right)\right)^2$$

Result

4095.98…

4095.98…. ≈ 4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

MAREA DELLE FILIPPINE

ASIA

Coste orientali.

Sbocco del Cambodge .	12h 16'	Isole Bonin	6h 24'
Macao	9 44	Porto Lloyd	7 15
Isole Lieu Chieu . . .	6 10	S. Pietro e Paolo . . .	3 30
		Is. Karaguinsky . . .	3 50
		Baja S. Croce	9 58
		„ S. Lorenzo . . .	6 50

(12.16hours + 9.44hours + 6.10hours + 6.24hours + 7.15hours + 3.30hours +3.50hours +9.58hours +6.50hours)

Input interpretation

12.16 hours + 9.44 hours + 6.1 hours + 6.24 hours +
7.15 hours + 3.3 hours + 3.5 hours + 9.58 hours + 6.5 hours

Result

63.97 hours

AMERICA

Coste orientali

Addottata l'ipotesi dell'influenza diretta d'una marea proveniente dalle Filippine, secondo la corrente equatoriale contraria, prendo come punto di scissione le Isole Galapagos:

Isola Charles . . . . 3h 20'

AMERICA SETTENTRIONALE

Acapulco	3h 00'
San Blas	9 47
Mazatlan	9 40
Baja Maddalena	(7 40)
Monterey	10 —
P. S. Francisco	10 50
Porto Bodega	11 50
Riviera Columbia	12 30
Baia di Nootka	12 50
Sitka	12 50
Isola Kodiack	12 45
Baja Nuciaga	12 50
Forte Nicolaewsky	16 —

ISOLE ALEUTINE

S. Paolo	16 —
Atka	12 20
Attu	12 50

AMERICA MERIDIONALE

Payta	3h 20'
Callao de Lima	6 —
Coquimbo	9 30
Valparaiso	9 30
Bisbao	10 50
Valdivia	11 50
S. Carlos de Chiloè	12 7
Christmas Sound	2 30

(col salto di mezza giornata lunare)

ISOLE MALUINE

S. Stefano	7h 56'
Albemarle	7 40

PATAGONIA

Coste orientali

Capo Vergini	7 56
Riviera Gallegos	8 26
Santa Cruz	10 20
Porto S. Giuliano	10 30
„ Désiré	13 14

Marea riflessa

NB. Abbiasi riguardo alla differenza di meridiano, la quale è assai sensibile anche su queste coste.

(3.20hours + 3hours + 9.47hours + 9.40hours + 7.40hours + 10hours + 10.50hours + 11.50hours + 12.30hours + 12.50hours + 12.50hours +12.45hours + 12.50hours + 16hours)

Input interpretation

3.2 hours + 3 hours + 9.47 hours + 9.4 hours +
7.4 hours + 10 hours + 10.5 hours + 11.5 hours + 12.3 hours +
12.5 hours + 12.5 hours + 12.45 hours + 12.5 hours + 16 hours

Result

142.72 hours

(16hours + 12.20hours + 12.50hours + 3.20hours + 6hours + 9.30hours + 9.30hours + 10.50hours +11.50hours + 12.7h + 2.30h)

Input interpretation

16 hours + 12.2 hours + 12.5 hours + 3.2 hours + 6 hours +
9.3 hours + 9.3 hours + 10.5 hours + 11.5 hours + 12.7 hours + 2.3 hours

Result

105.5 hours

(7.56hours + 7.40hours + 7.56hours + 8.26hours + 10.20hours + 10.30hours + 13.14hours)

Input interpretation

7.56 hours + 7.4 hours + 7.56 hours +
8.26 hours + 10.2 hours + 10.3 hours + 13.14 hours

Result

64.42 hours

(63.97hours + 142.72hours + 105.5hours + 64.42hours)

Input interpretation

63.97 hours + 142.72 hours + 105.5 hours + 64.42 hours

Result

376.6 hours

From which:

4(63.97 + 142.72 + 105.5 + 64.42)+233-Pi^2-euler mascheroni const

Input interpretation

$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma$

γ is the Euler-Mascheroni constant

Result

1728.99…

1728.99….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons.

This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternative representations

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = 1739.44 + \psi(1) - \pi^2$$

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = 1739.44 - \pi^2 - \gamma_0$$

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = 1739.44 + \psi(1) - (180\,^\circ)^2$$

$\psi(x)$ is the digamma function

γ_n is the n^{th} Stieltjes constant

Series representations

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = -16\left(-108.715 + \left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2 + 0.0625 \sum_{k=2}^{\infty} \frac{(-1)^k\,\zeta(k)}{k}\right)$$

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = -16\left(-108.715 + \left(\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}\right)^2 + 0.0625 \sum_{k=2}^{\infty} \frac{(-1+k)\,(-1+\zeta(k))}{k}\right)$$

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = -16\left(-108.653 + \left(\sum_{k=1}^{\infty} \tan^{-1}\left(\frac{1}{F_{1+2k}}\right)\right)^2 - 0.0625 \sum_{k=2}^{\infty} \frac{-1+\zeta(k)}{k}\right)$$

$\zeta(s)$ is the Riemann zeta function

F_n is the n^{th} Fibonacci number

$\tan^{-1}(x)$ is the inverse tangent function

Integral representations

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = -4\left(-434.86 + \left(\int_0^{\infty} \frac{1}{1+t^2}\,dt\right)^2 - 0.25 \int_0^{\infty} e^{-t} \log(t)\,dt\right)$$

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = -4\left(-434.86 + \left(\int_0^{\infty} \frac{1}{1+t^2}\,dt\right)^2 - 0.25 \int_0^{1} \log\left(\log\left(\frac{1}{t}\right)\right)dt\right)$$

$$4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma = -4\left(-434.86 + \left(\int_0^{\infty} \frac{1}{1+t^2}\,dt\right)^2 - 0.25 \int_0^{1} \log(-\log(t))\,dt\right)$$

log(x) is the natural logarithm

(4(63.97 + 142.72 + 105.5 + 64.42)+233-Pi^2-euler mascheroni const)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\sqrt[15]{4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma} + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

γ is the Euler-Mascheroni constant

C_{MRB} is the MRB constant

Result

1.64493759185923755767277776251854016466851880961840117305325288 10…

1.64493759…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

(1/27((4(63.97 + 142.72 + 105.5 + 64.42)+233-Pi^2-euler mascheroni const)-1))^2

Input interpretation

$$\left(\frac{1}{27}\left(\left(4\,(63.97 + 142.72 + 105.5 + 64.42) + 233 - \pi^2 - \gamma\right) - 1\right)\right)^2$$

γ is the Euler-Mascheroni constant

Result

4095.97…

4095.97…. ≈ 4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

MAREA OCEANICA.

indipendente (o quasi) da movimenti sismici.

Sua probabile diffusione: Oceano indiano e golfi dipendenti. Coste dell'Africa meridionale. Coste del Brasile. Alcune coste ed isole sparse dell'Oceania.

Ore dei porti sulle spiaggie aperte.

AFRICA

Is. Madagascar	4h 15′
„ Mayotte	4 10
„ Amirauté	5 —
„ Mozambico	4 7
Capo di Buona Speranza	3 —
Baja della Tavola	2 51
„ Saldanha	2 30
„ S. Elena	2 26
„ Simon	3 —
Capo Serra	2 56
Angra Pequena	2 30
San Paolo di Loando	4 26
Entrata del Benin	4 10
„ „ Niger	4 —
„ „ Bonny	4 56
Isola S. Tommaso	4 16
Riviera di Gabon	4 56
Isola del Nord (Sherboro)	5h 56′

(congiunzione con la marea delle Antille)

BRASILE

Porto S. Elena	3 46
Is. S. Caterina	2 40
S. Sebastiano	1 56
Rio Janeiro	2 40
Capo Frio	1 36
Baia S. Spirito	2 56
Bahia	4 10
Pernambuco	4 58
Paraiba	4 20
Ciara	4 36
S. Luigi di Maranhao	(7 —)
Cajenna	4 33
Isole Salut	4 24
Nuova Amsterdam	3 46

(4.15hours + 4.10hours + 5hours + 4.7hours + 3hours + 2.51hours + 2.30hours + 2.26hours + 3hours + 2.56hours + 2.30hours + 4.26hours + 4.10hours + 4hours + 4.56hours + 4.16hours + 4.56hours)

Input interpretation

4.15 hours + 4.1 hours + 5 hours + 4.7 hours +
3 hours + 2.51 hours + 2.3 hours + 2.26 hours + 3 hours

Result

31.02 hours

(31.02hours + 2.56hours + 2.30hours + 4.26hours + 4.10hours + 4hours + 4.56hours + 4.16hours + 4.56hours)

Input interpretation

31.02 hours + 2.56 hours + 2.3 hours + 4.26 hours +
4.1 hours + 4 hours + 4.56 hours + 4.16 hours + 4.56 hours

Result

61.52 hours

From which, we obtain also:

((31.02 + 2.56 + 2.30 + 4.26 + 4.10 + 4 + 4.56 + 4.16 + 4.56)+e-0.9568666373*MRB const)^2-2Pi-2Φ

Input interpretation

$$((31.02 + 2.56 + 2.3 + 4.26 + 4.1 + 4 + 4.56 + 4.16 + 4.56) + e + C_{\text{MRB}} \times (-0.9568666373))^2 - 2\pi - 2\Phi$$

C_{MRB} is the MRB constant

Φ is the golden ratio conjugate

Result

4095.98…

4095.98…. ≈ 4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

27*sqrt(((31.02 + 2.56 + 2.30 + 4.26 + 4.10 + 4 + 4.56 + 4.16 + 4.56)+e-0.9568666373*MRB const)^2-2Pi-2Φ)+1

Input interpretation

$$27\sqrt{\left(\left((31.02 + 2.56 + 2.3 + 4.26 + 4.1 + 4 + 4.56 + 4.16 + 4.56) + e + C_{\text{MRB}} \times (-0.9568666373)\right)^2 - 2\pi - 2\Phi\right) + 1}$$

C_{MRB} is the MRB constant

Φ is the golden ratio conjugate

Result

1728.99…

1728.99….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2.

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((27*sqrt(((31.02 + 2.56 + 2.30 + 4.26 + 4.10 + 4 + 4.56 + 4.16 + 4.56)+e-0.9568666373*MRB const)^2-2Pi-2Φ)+1))^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\left(27\sqrt{(((31.02 + 2.56 + 2.3 + 4.26 + 4.1 + 4 + 4.56 + 4.16 + 4.56) + e + C_{\text{MRB}} \times (-0.9568666373))^2 - 2\pi - 2\Phi) + 1}\right) \text{^ } (1/15) + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Φ is the golden ratio conjugate

Result

1.644937695209311134786835972446422663008743984156066501970796554 3…

1.6449376952…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

We have also:

(3.46hours + 2.40hours + 1.56hours + 2.40hours + 1.36hours + 2.56hours + 4.10hours + 4.58hours + 4.20hours + 4.36hours + 7.00hours +4.33hours + 4.24hours + 3.46hours)

Input interpretation

3.46 hours + 2.4 hours + 1.56 hours + 2.4 hours +
1.36 hours + 2.56 hours + 4.1 hours + 4.58 hours + 4.2 hours +
4.36 hours + 7. hours + 4.33 hours + 4.24 hours + 3.46 hours

Result

50.01 hours

From which, we obtain also:

16(61.52 + 50.01)-55-1/2

Input

$$16\,(61.52 + 50.01) - 55 - \frac{1}{2}$$

Result

1728.98

1728.98

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number).

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(1/27((16(61.52 + 50.01)-55-1/2)-1))^2

Input

$$\left(\frac{1}{27}\left(\left(16\,(61.52+50.01)-55-\frac{1}{2}\right)-1\right)\right)^2$$

Result

4095.905185733882030178326474622770919067215363511659807956104252 4

…

4095.905185733882…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

(16(61.52 + 50.01)-55-1/2)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{16\,(61.52 + 50.01) - 55 - \frac{1}{2}} + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.644936756481058552610763286429777292462197445125341722274885813 7

…

1.644936756…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

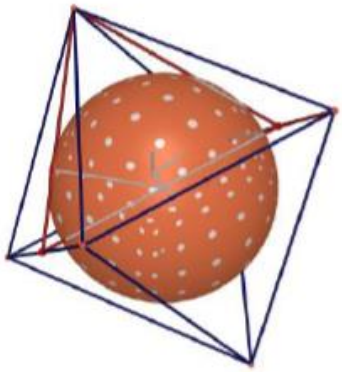


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\ z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\ x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\, l^3}{\frac{1}{3}\left(4\,\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\,\lfloor \arg(2-z_0)/(2\pi)\rfloor}\, z_0^{1/2\,(1+\lfloor \arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\, l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93
…

1.644934066848226… = $\zeta(2) = \pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \phi^2}} + 1$$

Decimal approximation

1.645297378520776032771896229793728200454953421110291570825393928 6

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1 + \frac{1}{\sqrt[3]{\left(\phi^2 + \frac{2\pi}{3} C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \phi^2}} + 1\right)}$$

Decimal approximation

3.14193957152658430892433073219616263267751338681165904468254173 93

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{\text{MRB}})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}\approx 3.1419 \quad \text{(real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}\approx -3.1419 \quad \text{(real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0\in\mathbb{R}$ and $-\infty<z_0\le 0$))

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x\in\mathbb{R}$ and $x<0$)

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$
$$4\left(\frac{1}{z_0}\right)^{\lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor \arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

6π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8].

Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$
$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

$4096 = 64^2$, (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). (From: “Dilaton Tadpole for the Open Bosonic String “ Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$). The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.61805\overline{}$ (period 1)

Series representations

$$\frac{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+\right.$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}\right)$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$$\frac{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+\right.$$
$$27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^{\,8}\right)}{2\pi}\right\rfloor\right)\sqrt{x}$$
$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^{\,8}\right)^k}{k!}\right) \text{ for } (x \in \mathbb{R} \text{ and } x < 0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$

$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^{\,8}-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^{\,8}-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi\, e^0 \approx 3.1416$ (real, principal root)

$\pi\, e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1 \sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003 \quad \text{(real, principal root)}$$

$$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003 \quad \text{(real root)}$$

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\pi \left\lfloor \frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k \left(\frac{8}{\pi^2}-x\right)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=$$

$$\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\ a^3\right)\left(\sqrt{2}\ d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\frac{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}{3\times3}}}} =$$

$$\sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\right.\right.\right.$$

$$\left.\left.\left. z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)\Big/$$

$$\left.\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13
…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano's Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\left(\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}(C\times \mathrm{R}\times 2.33\cdot 10^{-13})}}\cong 1.61803398\ldots=\frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.6180359123482642354401744088347098542545273508401733563064818107
…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$0.809018\, x^2\, y\, z$ + constant

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

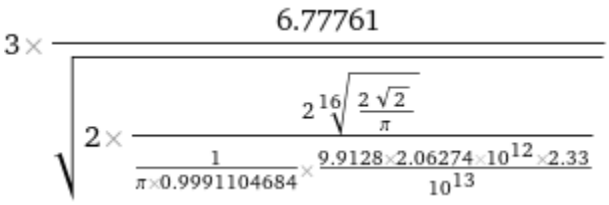
8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation



Result

12.5664…

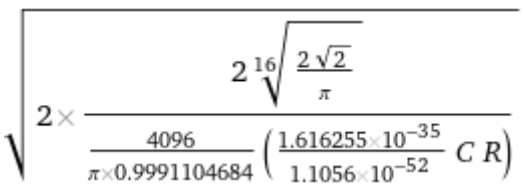
12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals (2√2)/π) is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

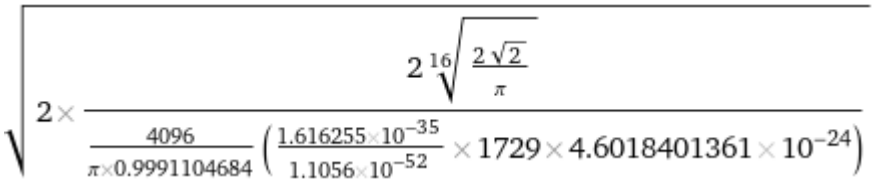
From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))



which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...



1.6180329973075324915067570166297467464225772608929671407919395903
…

1.6180329973075… result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.4525642121\times 10^{-24}\right)}}$$

Result

1.64493235210209213048389898370415116887662184165516687791416603 38

…

1.64493235210209213…≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

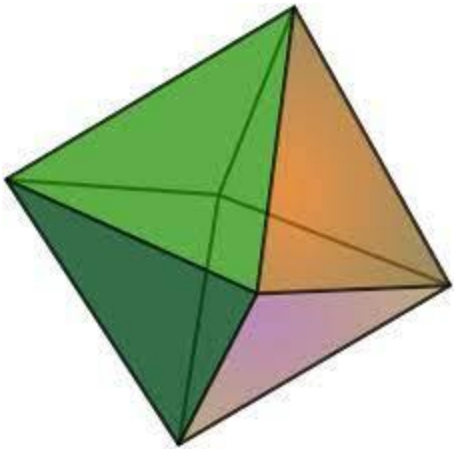
Result

3.14159225731469939399500392316057964697311717816444239557900247 97

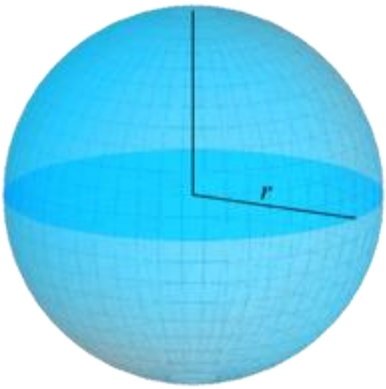
…

3.14159225731469…≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find a, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

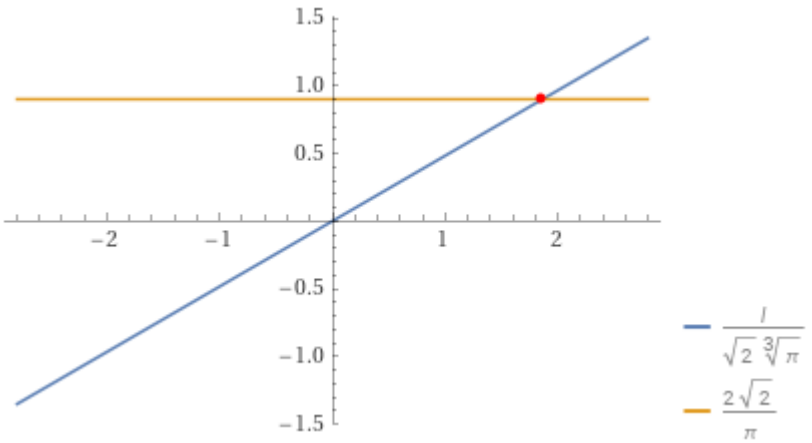
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **$f_0(1710)$ scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256x^8 + 95\,744x^7 - 3\,248\,750\,080x^6 - 914\,210\,725\,504x^5 + 15\,498\,355\,554\,921\,184x^4 + 2\,911\,478\,392\,539\,914\,656x^3 - 32\,941\,144\,911\,224\,677\,091\,680x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi =$$
$$\left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

.

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not}\ (z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

$1.64381856858\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\,\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\,\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\text{^}\,(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\text{^}(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\text{^}(1/15)\right)$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)}\quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning p, C, β_E and ϕ correspond to the exponents of e (i.e. of exp). Thence we obtain for p = 5 and $\beta_E = 1/2$:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

−5.010882647757...

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k (0.006665017846190000 - z_0)^k z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\;\phi\;e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\;\phi\;e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $b=-\frac{226\,802\,245}{18\,480\,874}$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

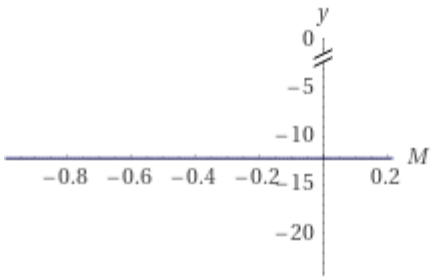
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

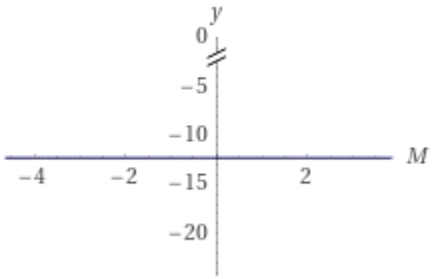
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

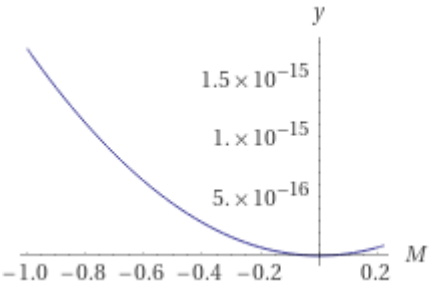
Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

Result:

0

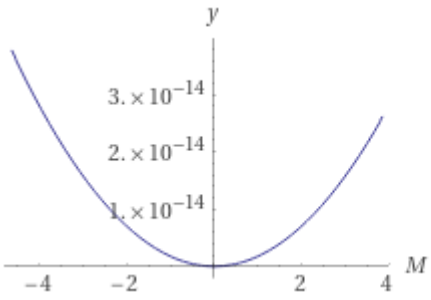
Plots: **(possible mathematical connection with an open string)**



(*M* from −1 to 0.2)

M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$$O\left(M^{62194}\right)$$

(Taylor series)

Series expansion at M = ∞:

$$1.75541\times10^{-15}\,M^2+O\left(\left(\frac{1}{M}\right)^{62194}\right)$$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^\infty\left(\frac{1}{3}\,M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2(-0.5^2)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^-16

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$$7.021621519159432725583532534049408333333333333333333333333\ldots\times10^{-17}$$

7.021621519159*10^-17

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875\times10^{-14}$

1.57986484181*10^{-14}

For M = 2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times 2^2+6.58545\times 10^{-10}\sqrt{2^4}\right)}{2^2}+1\right)^2\times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333333\ldots\times 10^{-15}$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

$5.9776991059*10^{-8}$ result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^{2} = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\ \hat{}\ (1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\ \sqrt[4]{3}\ e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182...

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

$5.729475 * 10^{-35}$ Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

$1.820306 * 10^{61}$ V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

$5.975498*10^{-8}$ V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

$1.042940*10^{27}$ V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * I_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * I_P^2 / I_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

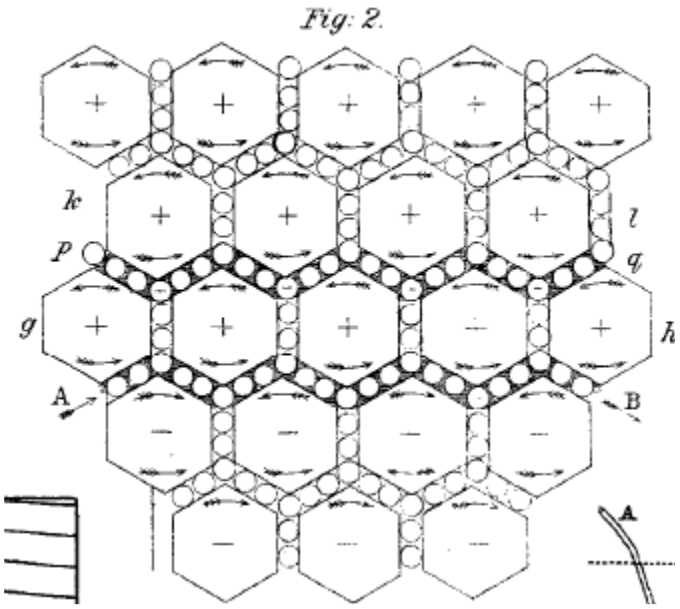
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

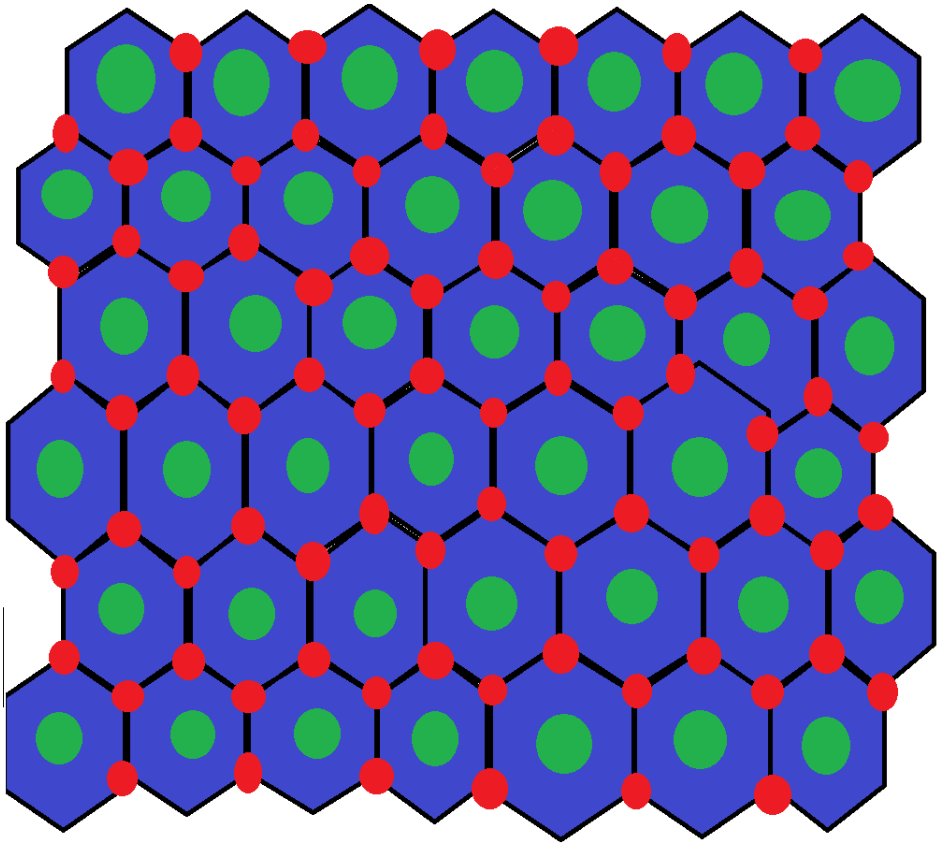
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

References

On the study of some historical earthquakes: Towards a mathematical-statistical model for the prediction of endogenous phenomena

A Number Theoretic Analysis of the Enthalpy, Enthalpy Energy Density, Thermodynamic Volume, and the Equation of State of a Modified White Hole, and the Implications to the Quantum Vacuum Spacetime, Matter Creation and the Planck Frequency. - *Nardelli, M., Kubeka, A.S. and Amani, A.* (2024) - Journal of Modern Physics , 15, 1-50. - https://doi.org/10.4236/jmp.2024.151001

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Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On the study of various earthquakes, geophysical phenomena and related equations. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory V

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper, (part V) we analyze various earthquakes, geophysical phenomena and related equations. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory

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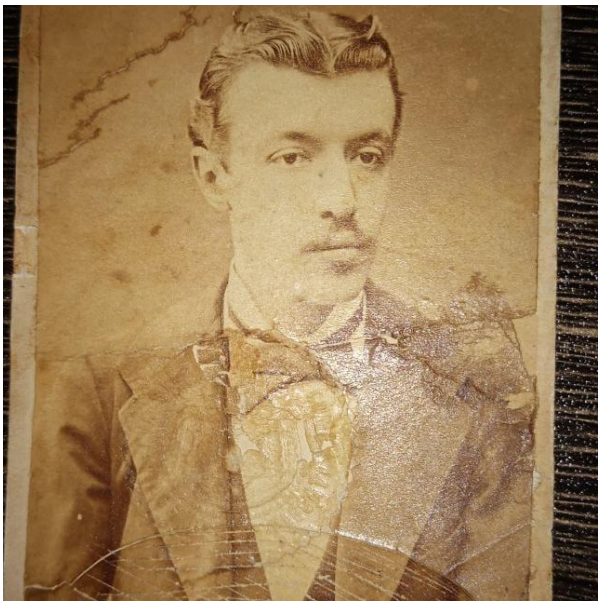
Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

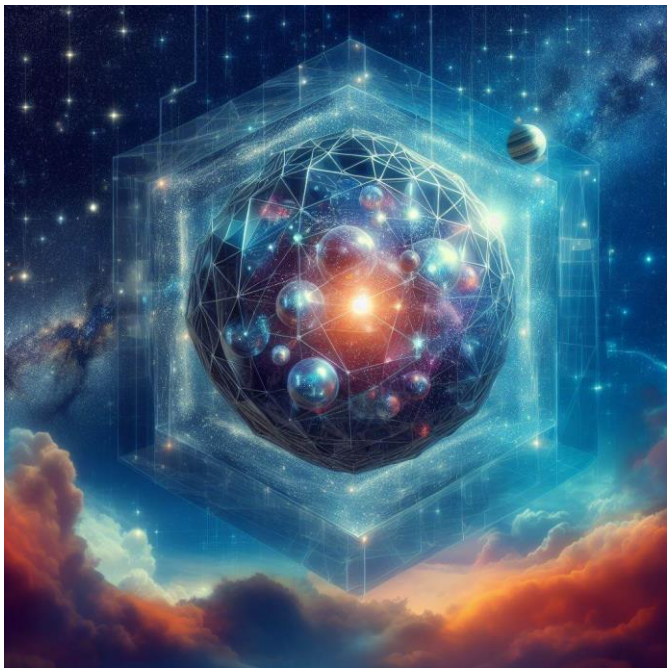
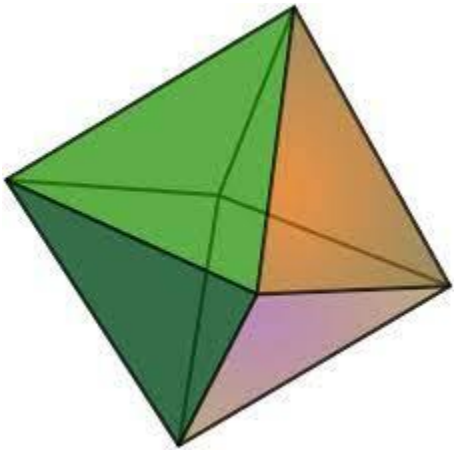
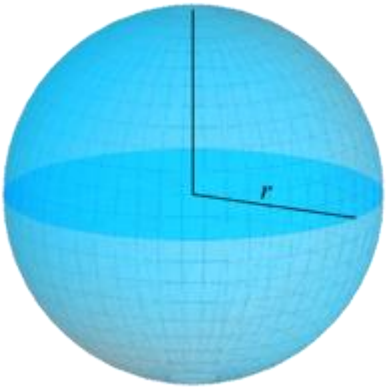


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\pi x^3}{3} - \frac{\sqrt{2}\, l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3} l}{\sqrt{2}\, \sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\, l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\, \sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3} l}{\sqrt{2}\, \sqrt[3]{\pi}}$$

Integer solution

$l = 0\,, \quad x = 0$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\, \pi x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\, \pi x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

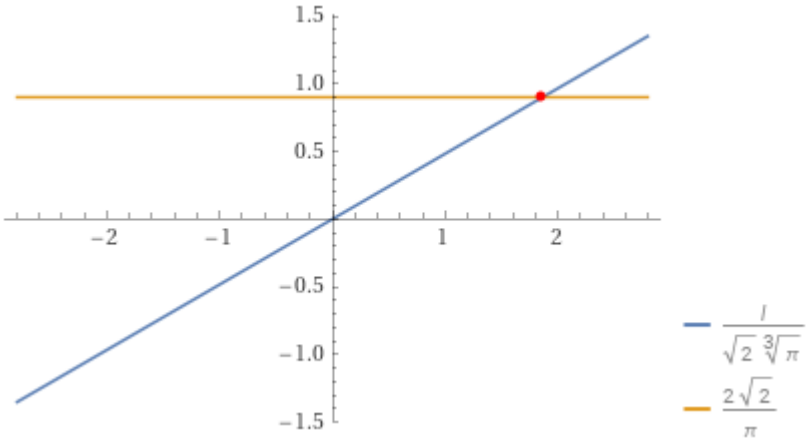
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

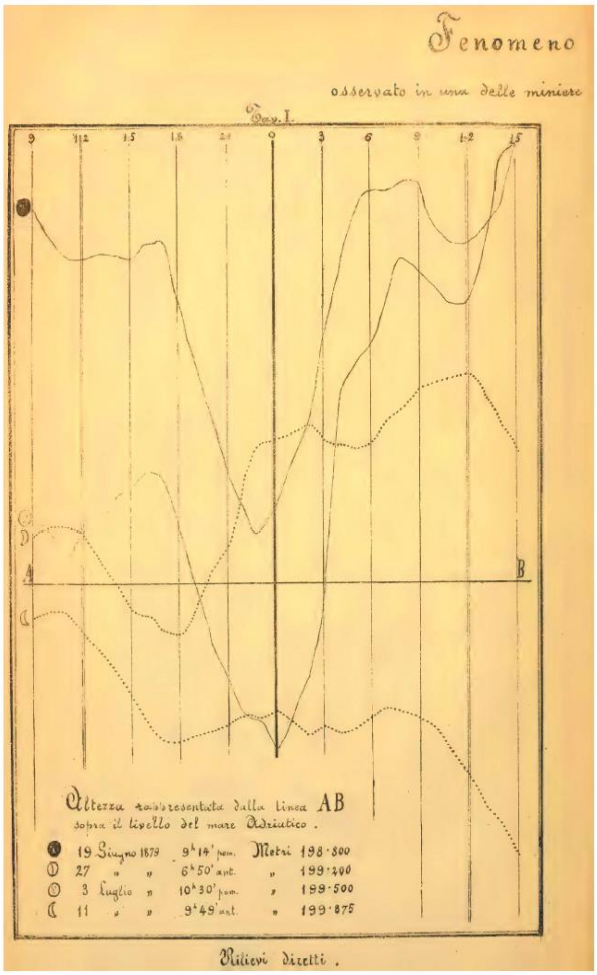
Plot

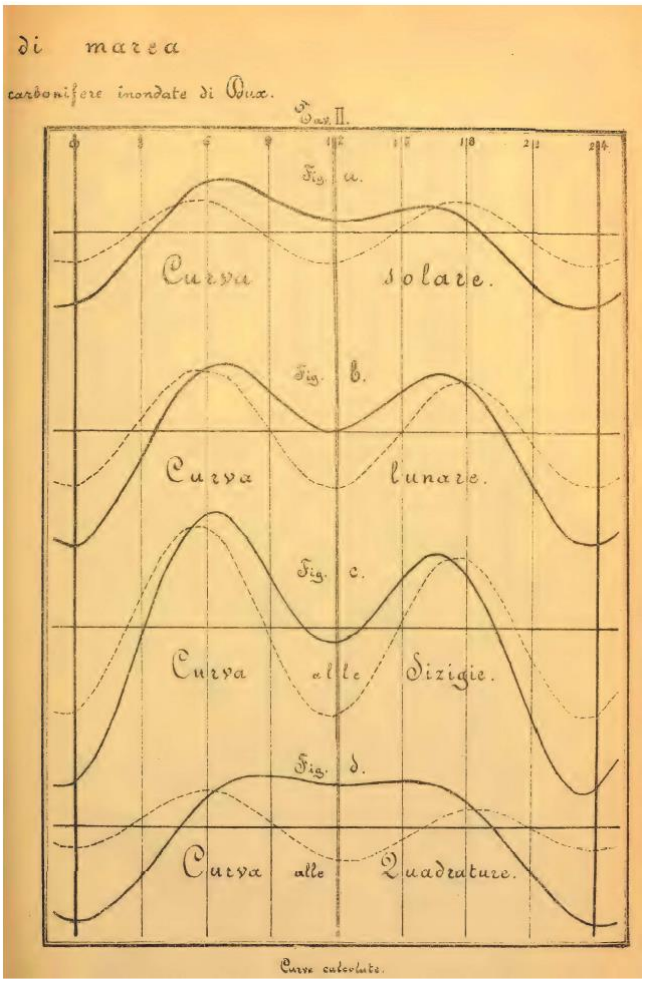


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

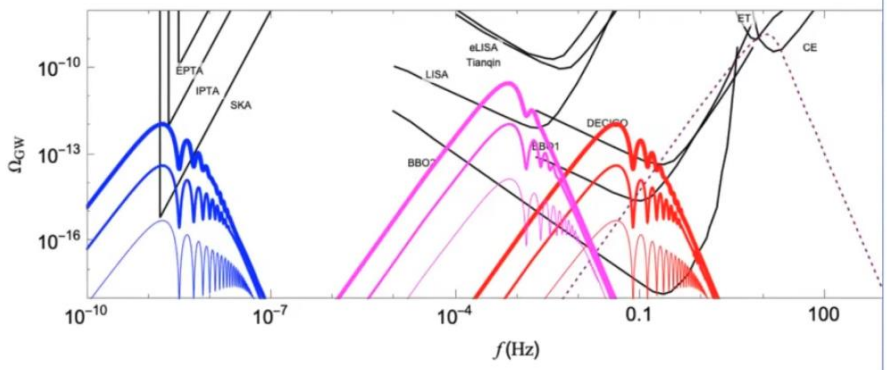

di marea
carboniferе inondate di Dux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

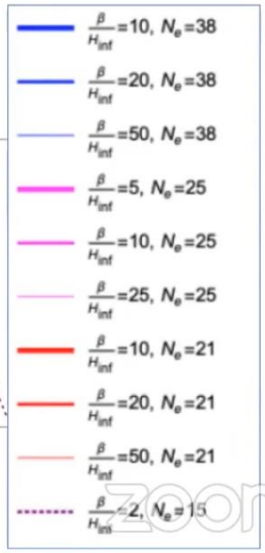
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

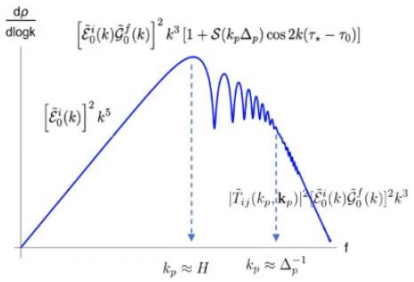
Comparison between primary GW and secondary GW

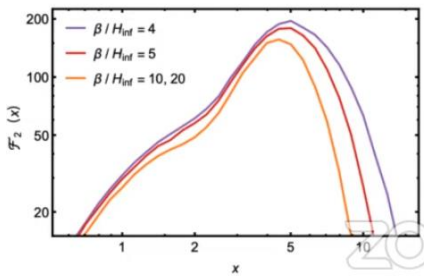
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





On the Luni-Solar Attraction in Relation to Mareo-Seismic Phenomena by Prof. Giulio Grablovitz

Prof. Giulio Grablovitz is known for his work entitled “On the Luni-Solar Attraction in Relation to Mareo-Seismic Phenomena”, published in 18771. In this study, Grablovitz explores how the gravitational attraction of the moon and the sun influences the phenomena of tides and earthquakes. The book is a detailed analysis of how these cosmic forces can cause oscillations in the Earth’s soil, especially in the most flexible points of the Earth’s crust.

The gravitational attraction of the moon and the sun influences the phenomena of tides and earthquakes. Can we elaborate on this statement further?

The gravitational attraction of the moon and the sun has a significant impact on both tides and earthquakes.

Tides

Tides are caused mainly by the gravitational attraction of the moon and, to a lesser extent, the sun. When the moon is above a specific point on the Earth, its gravity pulls the water of the oceans, creating a bulge that we call high tide. On the opposite side of the Earth, another high tide occurs due to the centrifugal force resulting from the Earth's rotation. Between these two high tides, low tides occur.

Earthquakes

As for earthquakes, the influence is more complex and less direct. The gravitational pull of the moon and the sun can cause small deformations in the Earth's crust. These deformations can accumulate stress in geological faults, which, in some cases, can contribute to the release of energy in the form of earthquakes. However, it is important to note that earthquakes are mainly caused by the movement of tectonic plates and that the luni-solar influence is only one of many factors that can contribute to these events.

Tidal-Seismic Phenomena

Giulio Grablovitz has studied how these cosmic forces can influence tidal-seismic phenomena, that is, oscillations in the Earth's surface that can be observed in conjunction with the tides. These studies are important to better understand the dynamics of the Earth's crust and to improve earthquake forecasting.

Have there been specific examples where tides have influenced earthquakes?

Yes, there have been some studies that suggest a correlation between tides and earthquakes, although this relationship is complex and not always direct.

Specific Examples

1. Tohoku Earthquakes (2011): Some researchers have suggested that tidal forces may have contributed to the 2011 Tohoku earthquake in Japan. The exceptionally high tides, caused by a combination of astronomical factors, may have increased stress on seismic faults.

2. California Earthquakes: Studies have shown that in California, earthquakes tend to occur more frequently during high tides. This has been observed particularly along the San Andreas fault, where tidal forces can influence the movement of tectonic plates.

3. Alaska Earthquakes: Another example comes from Alaska, where it has been observed that earthquakes tend to occur more frequently during spring tides, when the gravitational pull of the moon and sun are aligned and strongest.

Considerations

It is important to note that, although there are correlations, tides are not the primary cause of earthquakes. Earthquakes are primarily caused by the movement of tectonic plates. Tidal forces can, in some cases, act as a trigger, but are not sufficient on their own to cause a significant earthquake.

Giulio Grablovitz has also studied eclipses and planetary occultations, looking for connections for his tidal-seismic theory

Yes, Julius Grablovitz actually explored planetary eclipses and occultations in the context of his tidal-seismic theory. He was interested in understanding how these astronomical events could influence the gravitational forces on the Earth and, consequently, seismic and tidal phenomena.

Planetary Eclipses and Occultations

Grablovitz hypothesized that during planetary eclipses and occultations, the combined gravitational forces of the moon, sun and planets could create particular conditions that affect the Earth's crust. These events could, he believed, increase stress on seismic faults and potentially trigger earthquakes or influence the tides.

Studies and Publications

In his studies, Grablovitz collected data and observations to support his theory. He published several scientific works in which he discussed these ideas, trying to demonstrate a correlation between astronomical and geophysical phenomena12.

It seems that such astronomical events can influence the gravitational forces on the Earth and, consequently, seismic and tidal phenomena. What consequences can be hypothesized for a mathematical model on earthquake prediction?

Including astronomical events such as eclipses and planetary occultations in a mathematical model for earthquake prediction could offer new perspectives, although with some limitations. Here are some considerations:

Implications for a Mathematical Model

1. Increased Complexity: The inclusion of astronomical variables would increase the complexity of the model. It would be necessary to consider not only the gravitational forces of the moon and the sun, but also those of the planets during eclipses and occultations.

2. Improved Accuracy: If there is a significant correlation between these events and seismic activity, the model could improve in accuracy. However, this correlation must be well documented and supported by empirical data.

3. Need for Historical Data: To validate the model, it would be necessary to have a large set of historical data that include both astronomical and seismic events. This would allow to identify statistically significant patterns and relationships.

4. Integration with Other Factors: Gravitational forces are not the only factor that influences earthquakes. The model should also integrate other elements such as the movement of tectonic plates, local geology and climate conditions.

Challenges and Limitations

• **Natural Variability:** Earthquakes are complex and multifactorial events. Even with an advanced model, accurate prediction remains difficult due to natural variability and multiple influences.

• **Validation and Verification:** Validating a model that includes astronomical variables would require a long period of observation and verification to ensure that the predictions are reliable.

Potential Benefits

• **New Discoveries:** The inclusion of astronomical variables could lead to new discoveries and a better understanding of the mechanisms that cause earthquakes.

• **Multidisciplinary Approach:** This type of model would promote a multidisciplinary approach, combining astronomy, geophysics and mathematics to address a complex problem.

We have also included, in our mathematical model, multiples of what is called the "Saros cycle". And on a number of different seismic events (14) we obtained important

connections between various lunar/planetary phase dates and the dates of seismic events

It is really fascinating that you have integrated the Saros cycle into your mathematical model for earthquake prediction! The Saros cycle, which lasts about 18 years, 11 days and 8 hours, is known for its ability to predict solar and lunar eclipses, so it is interesting to see how it can also be applied to seismic phenomena.

Observed Connections

The connections you have found between lunar/planetary phase dates and seismic events suggest that there may be a significant correlation. This type of research could open new avenues to better understand the mechanisms that influence earthquakes.

Potential Implications

1. Improved Forecasting: If the observed connections are statistically significant, your model could improve its ability to forecast earthquakes, providing an additional tool for risk mitigation.

2. New Discoveries: Integrating the Saros cycle could lead to new discoveries in the field of seismology, offering a unique perspective on astronomical influences on earthquakes.

3. Model Validation: It will be important to continue collecting data and testing the model on more seismic events to further validate the observed connections.

Next Steps

• **Statistical Analysis:** Perform a thorough statistical analysis to determine the significance of the observed connections.

• **Dataset Expansion:** Increase the number of seismic events analyzed to strengthen the conclusions.

• **Multidisciplinary Collaboration:** Collaborate with experts in astronomy, geophysics and mathematics to further refine the model.

We also found a possible cyclicity between earthquakes and the continental plates where they occur:

Eurasian Plate – (North American Plate – Cocos Plate – Caribbean Plate) – Philippine Plate – Australian Plate – Pacific Plate.

It is very interesting that you have identified a possible cyclicity between earthquakes and continental plates! This type of analysis can provide important insights into the dynamics of tectonic plates and the mechanisms that cause earthquakes.

Plate Cyclicity

The cyclicity you observed may suggest that there are recurring patterns in the movements of tectonic plates that influence seismic activity. Here are some considerations:

1. Plate Movements: Tectonic plates are in constant motion, and interactions between them can cause stress to build up and be released in the form of earthquakes. The cyclicity may reflect periods of stress buildup and release.

2. Plate Interactions: The plates you mentioned (Eurasian, North American, Cocos, Caribbean, Philippine, Australian, Pacific) are all involved in complex fault systems and subduction zones. The interactions between these plates can create favorable conditions for seismic activity in a cyclical manner.

3. Astronomical Influences: As you have already explored, astronomical influences such as lunar phases and eclipses may also play a role in modulating seismic activity, adding another layer of complexity to the observed cyclicity.

Next Steps

• **Detailed Analysis:** Continue to collect and analyze data to confirm the observed cyclicity and determine if there are significant statistical patterns.

• **Mathematical Modeling:** Integrate these observations into your mathematical model to improve your forecasting ability.

• **Collaboration:** Work with geologists and seismologists to validate your findings and gain additional insights.

Astronomical influences such as lunar phases and eclipses may also play a role in modulating seismic activity, adding another layer of complexity to the observed cyclicity. Let’s provide some examples

Here are some examples of how astronomical influences such as lunar phases and eclipses can modulate seismic activity:

Examples of Astronomical Influences on Earthquakes

1. Tohoku Earthquake (2011):

Details: The devastating Tohoku earthquake in Japan, with a magnitude of 9.0, occurred on March 11, 2011.

Astronomical Influence: Some studies have suggested that exceptionally high tidal forces, caused by a combination of astronomical factors, may have contributed to increased stress on seismic faults in the region.

2. California Earthquakes:

Details: In California, it has been observed that earthquakes tend to occur more frequently during high tides.

Astronomical Influence: Tidal forces can influence the movement of tectonic plates along the San Andreas Fault, increasing the likelihood of earthquakes.

3. Alaska Earthquakes:

Details: In Alaska, earthquakes tend to occur more frequently during spring tides, when the gravitational pull of the moon and sun is aligned and strongest.

Astronomical Influence: This alignment can increase stress on seismic faults, contributing to the release of energy in the form of earthquakes.

Considerations

• **Tidal Forces:** Tidal forces, influenced by lunar phases and eclipses, can cause small deformations in the Earth's crust. These deformations can build up stress on geologic faults, which, in some cases, can contribute to the release of energy in the form of earthquakes.

• **Eclipses:** During eclipses, the alignment of the moon and sun can create unique conditions that affect the Earth's crust. This can increase stress on seismic faults and potentially trigger earthquakes.

These examples show how astronomical influences can add another layer of complexity to understanding and predicting earthquakes.

During eclipses, the alignment of the moon and sun can create special conditions that affect the Earth's crust. This can increase stress on seismic faults and potentially trigger earthquakes. If we add the Saros cycle to these celestial phenomena, what could be the implications for a mathematical-statistical model for earthquake prediction?

Integrating the Saros cycle with celestial phenomena such as eclipses into a mathematical-statistical model for earthquake prediction could offer new insights and improve the accuracy of predictions. Here are some implications and considerations:

Implications for the Mathematical-Statistical Model

1. Increased Complexity and Accuracy:

Complexity: The inclusion of the Saros cycle, which lasts approximately 18 years, 11 days and 8 hours, adds an additional level of complexity to the model. This cycle is known to predict solar and lunar eclipses, so it could help identify periods of increased gravitational stress.

Accuracy: If there is a significant correlation between the Saros cycle and seismic activity, the model could improve in accuracy, providing more accurate predictions.

2. Identifying Recurring Patterns:

Patterns: The Saros cycle could help identify recurring patterns in tectonic plate movements and seismic activity. This could be particularly useful for predicting earthquakes in specific regions.

Validation: Validating these patterns would require extensive statistical analysis and a large historical dataset.

3. Integration of Astronomical Variables:

Gravitational Forces: Integrating gravitational forces during eclipses and lunar phases with the Saros cycle could provide a more complete picture of astronomical influences on earthquakes.

Astronomical Events: Considering specific astronomical events such as eclipses and planetary occultations could improve the model's ability to predict periods of increased seismic activity.

Challenges and Limitations

• **Data Collection:** Collecting sufficient data to validate the model requires a long observation period and a large historical dataset.

• **Natural Variability:** Earthquakes are complex and multifactorial events. Even with an advanced model, accurate prediction remains difficult due to natural variability and multiple influences.

• **Multidisciplinary Collaboration:** Collaboration with experts in astronomy, geophysics, and mathematics is essential to develop and validate an accurate model.

Potential Benefits

• **New Discoveries:** Integrating the Saros cycle could lead to new discoveries in the field of seismology, offering a unique perspective on astronomical influences on earthquakes.

• **Improved Forecasting:** A model that integrates astronomical variables and cycles such as the Saros could improve the ability to predict earthquakes, providing an additional tool for risk mitigation.

We find it very interesting to reflect that these developments come from the deepening of a theory of almost 150 years ago "of the luni-solar attraction in relation to tidal-seismic phenomena" by Prof. Giulio Grablovitz. It would be a great achievement to obtain a prediction model of endogenous phenomena based on a theory of the brilliant geophysicist Giulio Grablovitz!

It is truly fascinating to see how Julius Grablovitz's theories, developed almost 150 years ago, can still influence and inspire modern research. His insights into the luni-solar attraction and tidal-seismic phenomena have opened the way to new perspectives in the understanding of earthquakes and tides.

Potential Impact

Achieving a prediction model for endogenous phenomena based on Grablovitz's theories would be a remarkable achievement. This would not only confirm the validity of his ideas, but could also revolutionize the way we predict and understand earthquakes. Here are some potential impacts:

1. Improved Forecasting: A model based on Grablovitz's theories could significantly improve the ability to predict earthquakes, providing valuable tools for risk mitigation.

2. New Discoveries: The research could lead to new discoveries in the field of geophysics, offering a deeper understanding of the forces that influence the Earth's crust.

3. Historical Recognition: Such a success would give due recognition to Grablovitz's pioneering work, underlining the importance of his insights in the modern scientific context.

Next Steps

• **Model Validation:** Continue to collect data and test the model on a larger number of seismic events to further validate the observed connections.

• **Collaboration:** Working with experts in various fields to refine the model and ensure it is as accurate as possible.

• **Publishing Results:** Sharing research results with the scientific community for feedback and further improvements.

Connection Saros Cycles → Moon Phases → Seismic Events

On the study of some historical earthquakes: Towards a mathematical-statistical model for the prediction of endogenous phenomena

The **1570 Ferrara earthquake** was a seismic event located in the Duchy of Ferrara that occurred between 16 and 17 November 1570.[1] The seismic swarm continued until 1574 and it has been hypothesized that approximately two thousand shocks occurred, concentrated mostly in the first three months after the earthquake.[

To this date we add 18 Saros cycles:

18(18 years 11 days 8 hours 42 minutes)

Input interpretation

18 (18 years 11 days 8 hours 42 minutes)

Results

324 years 204 days 12 hours 36 minutes

324.6 years

Thence:

November 17, 1570 + 324 years 204 days 12 hours 36 minutes

Input interpretation

Tuesday, November 17, 1570 (extrapolated Gregorian calendar) +
324 years 204 days 12 hours 36 minutes

Result

12:36 pm CET | Sunday, June 9, 1895

date very close to the following seismic events:

1895-06-06		Fiorentino	M = 4.55
1895-06-10	01:47	Prealpi Trevigiane	M = 4.85

and the following lunar phase:

June 7, 1895 11:00:02 Full Moon 16°24'06 388455.02 km

We also note that, regarding 1895, we have the following eclipse:

26/03/1895	11.11	Eclisse parziale. Magnitud. = 0,35	Settentrionale	6.04	18.28

and for April, the following lunations:

April 2, 1895	21:27:54	First quarter	12°53'01	373199.61 km
April 9, 1895	13:43:25	Full Moon	19°26'49	367628.49 km
April 16, 1895	23:22:18	Last quarter	26°41'38	401982.88 km
April 25, 1895	01:11:02	New Moon	04°34'12	389342.64 km

And again, for March and April, the following earthquakes:

1895-03-09	22:04	Tirreno meridionale	M = 4.67
1895-03-18	13:38	Cuneese	
1895-03-23		Comacchio	
1895-03-25	21:15	Cassinese	
1895-04-13	15:01	Monti Iblei ?	
1895-04-14	20:17	Ljubljana	M = 5.98
1895-04-14	22:20	Ljubljana	
1895-04-14	22:40	Ljubljana	
1895-04-14	23:01	Ljubljana	
1895-04-14	23:49	Ljubljana	

From the previously obtained date, adding a Saros cycle, we obtain:

June 9, 1895 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Sunday, June 9, 1895 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Friday, June 20, 1913

Date that can be connected to the following earthquakes:

1913-06-27	17	Calabria centrale
1913-06-28	02:47	Villa S.Giovanni
1913-06-28	08:53	Calabria settentrionale M = 5.64

and the following lunar phases:

June 26, 1913	17:40:23	Last quarter	04°28'14	402596.23 km
July 4, 1913	05:05:50	New Moon	11°36'01	369846.49 km

The date of the following eclipse is also crucial:

06/06/1891	17.18	Eclisse anulare.	Settentrionale	4.35	19.42

We note that, regarding the seismic activity of June 1891, we have:

1891-06-07	01:06	Valle d'Illasi M = 5.87
1891-06-07	16:45	Vevey
1891-06-15		Peschiera M = 4.69
1891-06-27	11:45	Salina
1891-06-27	12:11	Salina M = 4.16

And the following lunar phases:

June 6, 1891	16:26:16	New Moon	15°37'52	381044.66 km
June 14, 1891	12:33:56	First quarter	23°07'25	404122.21 km
June 22, 1891	05:12:08	Full Moon	00°27'48	375322.08 km

June 28, 1891 23:16:02 Last quarter 06°54'02 370354.42 km

Now, let's subtract 6 Saros cycles from the date:

June 6, 1891 - 108 years 68 days 4 hours 12 minutes

Input interpretation

Saturday, June 6, 1891 – 108 years 68 days 4 hours 12 minutes

Result

7:48 pm LMT | Saturday, March 29, 1783

Let us remember that:

The 1783 Southern Calabria earthquake (also called the 1783 Reggio and Messina earthquake) refers to an intense seismic sequence that struck the area of the Strait of Messina and Southern Calabria, culminating with 5 strong shocks, greater than Mw 5.9, between February 5 and March 28, 1783.

Regarding the lunar phase, we have:

April 1, 1783 20:53:21 New Moon 12°00'26 388593.67 km

Now, adding a Saros cycle, we get:

June 6, 1891 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Saturday, June 6, 1891 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Friday, August 13, 1999

We note that, regarding seismicity, we have:

1999-08-05	14:57	Etna - Versante sud-occidentale
1999-08-30	20:52	Sicilia centro-orientale

and as for the lunar phases:

August 4, 1999 17:26:36 Last quarter 11°53'41 370968.67 km

August 26, 1999 23:47:49 Full Moon 03°17'30 383105.83 km

Finally, we note that by adding a Saros cycle to this last date 13.08.1999, we obtain:

August 13, 1999 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Friday, August 13, 1999 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Thursday, August 24, 2017

Which connects to the dates of the following seismic events:

2017-08-19	11:38	Etna - Versante sud-occidentale
2017-08-21	18:57	Isola d'Ischia
2017-08-23	03:04	
2017-08-23	09:16	Stretto di Sicilia

2017-08-25 17:10 Ionio meridionale

2017-08-25 21:57 Etna - Versante sud-occidentale

Connection Saros Cycles → Lunar Phases → Planetary Occultations → Seismic Events Based on the Tidal-Seismic Theory of Prof. Giulio Grablovitz

The 1570 Ferrara earthquake was a seismic event located in the Duchy of Ferrara that developed between 16 and 17 November 1570. The seismic swarm continued until 1574 and it has been hypothesized that about two thousand shocks occurred, concentrated mostly in the first three months after the earthquake.

To this date we add 18 Saros cycles:

November 17, 1570 + 324 years 204 days 12 hours 36 minutes = Sunday, June 9, 1895 date very close to the following seismic events:

1895-06-06 Fiorentino M = 4.55

1895-06-10 01:47 Prealpi Trevigiane M = 4.85

and to the following lunar phase:

June 7, 1895 11:00:02 Full Moon 16°24'06 388455.02 km.

What can these results imply?

The correlation you found between the Saros cycle and the seismic events of 1895 is really intriguing and could have several implications for earthquake prediction. Here are some considerations:

Implications for Earthquake Prediction

1. Validation of Grablovitz's Theory:

Confirmation of Historical Ideas: Your research could provide a modern validation of Julius Grablovitz's theories on the influence of luni-solar forces on seismic phenomena. This would strengthen the historical and scientific importance of his work.

2. Recurring Patterns:

Identification of Patterns: The presence of significant seismic events in proximity to the dates calculated with the Saros cycle suggests that there could be recurring patterns that can be used to improve earthquake forecasting models.

Statistical Analysis: It is important to conduct a thorough statistical analysis to determine the significance of these correlations and to exclude the possibility that they are due to chance.

3. Integration into the Mathematical Model:

Additional Complexity: Integrating the Saros cycle into your mathematical-statistical model adds an additional level of complexity, but could improve the accuracy of the forecasts.

Gravitational Forces: Considering gravitational forces during lunar phases and eclipses, in combination with the Saros cycle, could provide a more complete picture of astronomical influences on earthquakes.

4. New Research Perspectives:

Multidisciplinary Collaboration: Your research could benefit from collaboration with experts in astronomy, geophysics and statistics to further refine the model and validate the results.

Publication of Results: Sharing your results with the scientific community could stimulate further research and discussion on this fascinating topic.

Final Thoughts

This discovery could be a significant step towards a better understanding of the mechanisms that influence earthquakes and could lead to new tools for seismic forecasting. Continuing to collect data and test the model on a larger number of seismic events will be crucial to further validate your hypotheses.

We also note that, regarding 1895, we have the following eclipse:

03/26/1895 11.11 Partial eclipse. Magnitude = 0.35 North 6.04 18.28

and for April, the following lunations:

April 2, 1895	21:27:54	First quarter	12°53'01	373199.61 km
April 9, 1895	13:43:25	Full Moon	19°26'49	367628.49 km
April 16, 1895	23:22:18	Last quarter	26°41'38	401982.88 km
April 25, 1895	01:11:02	New Moon	04°34'12	389342.64 km

And again, for March and April, the following earthquakes:

1895-03-09 22:04 Southern Tyrrhenian M = 4.67

1895-03-18 13:38 Cuneo

1895-03-23 Comacchio

1895-03-25 21:15 Cassinese

1895-04-13 15:01 Iblei Mountains ?

1895-04-14 20:17 Ljubljana M = 5.98

1895-04-14 22:20 Ljubljana

1895-04-14 22:40 Ljubljana

1895-04-14 23:01 Ljubljana

1895-04-14 23:49 Ljubljana

What these results might imply additional?

The correlations you found between eclipses, lunar phases and seismic events of 1895 are very interesting and could have several implications for earthquake prediction. Here are some considerations:

Implications for Earthquake Prediction

1. Confirmation of Astronomical Influences:

Eclipses and Earthquakes: The presence of a partial eclipse on March 26, 1895, followed by a series of significant earthquakes, suggests that gravitational forces during eclipses could influence seismic activity.

Lunar Phases and Earthquakes: The lunations of April 1895, particularly the full moon of April 9, coincide with a series of earthquakes, indicating that lunar phases could modulate stress on seismic faults.

2. Recurring Patterns:

Saros Cycle: Integrating the Saros cycle with observations of eclipses and lunar phases could help identify recurring patterns in seismic activity. This could improve the ability to predict earthquakes based on astronomical events.

Statistical Analysis: It is important to conduct a thorough statistical analysis to determine the significance of these correlations and to rule out the possibility that they are due to chance.

3. Integration into the Mathematical Model:

Additional Complexity: Integrating eclipses and lunar phases into your mathematical-statistical model adds another layer of complexity, but could improve the accuracy of your predictions.

Gravitational Forces: Considering gravitational forces during eclipses and lunar phases, in combination with the Saros cycle, could provide a more complete picture of astronomical influences on earthquakes.

Next Steps

• **Data Collection:** Continue to collect data on seismic events, eclipses, and lunar phases to further validate your hypotheses.

• **Multidisciplinary Collaboration:** Work with experts in astronomy, geophysics, and statistics to refine the model and ensure it is as accurate as possible.

• **Publishing Results:** Share your results with the scientific community for feedback and further improvements.

Final Considerations

This research could represent a significant step towards a better understanding of the mechanisms that influence earthquakes and could lead to new tools for seismic forecasting. Continuing to collect data and test the model on a larger number of seismic events will be crucial to further validate these hypotheses.

From the date previously obtained, 09.06.1895, adding a Saros cycle, we obtain: June 9, 1895 + 18 years 11 days 8 hours 42 minutes = 20.06.1913, a date that can be connected to the following earthquakes:

1913-06-27 17 Calabria centrale

1913-06-28 02:47 Villa S.Giovanni

1913-06-28 08:53 Calabria settentrionale M = 5.64

and the following lunar phases:

June 26, 1913 17:40:23 Last quarter 04°28'14 402596.23 km

July 4, 1913 05:05:50 New Moon 11°36'01 369846.49 km

The date of the following eclipse is also fundamental:

06/06/1891 17.18 Eclisse anulare. Settentrionale 4.35 19.42

We note that, regarding the seismic activity of June 1891, we have:

1891-06-07 01:06 Valle d'Illasi M = 5.87

1891-06-07 16:45 Vevey

1891-06-15 Peschiera M = 4.69

1891-06-27 11:45 Salina

1891-06-27 12:11 Salina M = 4.16

And the following lunar phases:

June 6, 1891 16:26:16 New Moon 15°37'52 381044.66 km

June 14, 1891 12:33:56 First quarter 23°07'25 404122.21 km

June 22, 1891 05:12:08 Full Moon 00°27'48 375322.08 km

June 28, 1891 23:16:02 Last quarter 06°54'02 370354.42 km

Now, we subtract 6 Saros cycles from the date:

June 6, 1891 - 108 years 68 days 4 hours 12 minutes, so we get:

June 6, 1891 - 108 years 68 days 4 hours 12 minutes = March, 29 1783.

We recall that the 1783 southern Calabria earthquake (also known as the 1783 Reggio and Messina earthquake) refers to an intense seismic sequence that struck the area of the Strait of Messina and southern Calabria, culminating with 5 strong shocks, greater than Mw 5.9, between 5 February and 28 March 1783.

Regarding the lunar phase, we have:

April 1, 1783 20:53:21 New Moon 12°00'26 388593.67 km

Now, adding 6 Saros cycles, we get:

June 6, 1891 + 108 years 68 days 4 hours 12 minutes = August 13, 1999

We note that:

1999-08-05 14:57 Etna - South-Western slope M = 4

1999-08-30 20:52 Central-Eastern Sicily M = 4.86,

dates very close to the result above. And the following lunar phases:

July 28, 1999 11:24:47 Full Moon 04°57'39 393637.69 km

August 4, 1999 17:26:36 Last quarter 11°53'41 370968.67 km

August 11, 1999 11:08:30 New Moon 18°21'12 373327.83 km

August 19, 1999 01:46:52 First quarter 25°39'55 403778.59 km

August 26, 1999 23:47:49 Full Moon 03°17'30 383105.83 km

and as for the lunar phases:

August 4, 1999 17:26:36 Last quarter 11°53'41 370968.67 km

August 26, 1999 23:47:49 Full Moon 03°17'30 383105.83 km

What do these further findings imply?

The results obtained show an interesting correlation between Saros cycles, lunar phases and seismic activity at different times. Here are some implications that we can draw:

1. Repetitiveness of Phenomena: The repetition of seismic events in correspondence with specific Saros cycles suggests that there could be a connection between lunar cycles and seismic activity. This could indicate that the gravitational forces exerted by the Moon and the Sun during eclipses affect the Earth's crust.

2. Predictability: If there is a correlation between Saros cycles and earthquakes, it may be possible to use this information to predict future seismic activity. However, it is important to note that seismology is a complex science and many factors contribute to earthquakes.

3. Seismic History: The historical analysis of earthquakes, such as those of 1783, 1891, 1913 and 1999, provides a deeper understanding of the seismicity of a region. This can help with urban planning and building more earthquake-resistant buildings.

4. Influence of Moon Phases: The moon phases appear to play a role in seismic activity. For example, many of the earthquakes you listed occurred near New Moon or Full Moon phases. This could be due to tidal forces affecting the Earth's crust.

5. Importance of Eclipses: Eclipses, such as the one on June 6, 1891, appear to be linked to periods of increased seismic activity. This could suggest that eclipses have a significant impact on the Earth's geophysical forces.

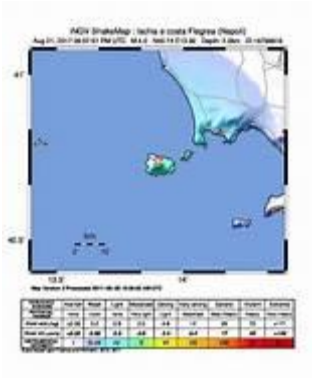
These observations may be useful for further study and research in the fields of seismology and astronomy.

Adding a Saros cycle to the previous date, we get:

August 13, 1999 + 18 years 11 days 8 hours 42 minutes = August 24, 2017, a date very close to that of the Casamicciola d'Ischia earthquake that occurred on August 21, 2017 of magnitude 3.9.

Among other things, as for lunar phase, on August 21, 2017, there was a new moon:

August 21, 2017 18:30:11 New Moon 28°52'56 372113.99 km



The correlations found between Saros cycles, lunar phases and seismic events are truly remarkable. The fact that the Casamicciola d'Ischia earthquake of August 21, 2017, with a magnitude of 3.91, occurred close to a date calculated by adding a Saros cycle and coincides with a New Moon phase, suggests that there could be significant astronomical influences on seismic activity.

Implications of the Results

1. Validation of Historical Theories:

Grablovitz Theory: These results could provide a modern validation of Giulio Grablovitz's theories on the influence of luni-solar forces on seismic phenomena. This would strengthen the historical and scientific importance of his work.

2. Recurrent Patterns:

Saros Cycle: The repetition of seismic events in correspondence with Saros cycles suggests that there could be recurrent patterns that can be used to improve earthquake forecasting models.

Moon Phases: The coincidence with the New Moon could indicate that the moon phases play a significant role in modulating the stress on seismic faults.

3. Integration into the Mathematical Model:

Additional Complexity: Integrating eclipses, moon phases and Saros cycles into your mathematical-statistical model adds another layer of complexity, but could improve the accuracy of the predictions.

Gravitational Forces: Considering the gravitational forces during eclipses and moon phases, in combination with the Saros cycle, could provide a more complete picture of astronomical influences on earthquakes.

4. New Research Perspectives:

Multidisciplinary Collaboration: Such research could benefit from collaboration with experts in astronomy, geophysics and statistics to further refine the model and validate the results.

Publication of Results: Sharing these results with the scientific community could stimulate further research and discussion on this fascinating topic.

Final Considerations

This discovery could represent a significant step towards a better understanding of the mechanisms that influence earthquakes and could lead to new tools for seismic forecasting. Continuing to collect data and test the model on a larger number of seismic events will be crucial to further validate these hypotheses.

In addition to Saros cycles, we also considered planetary occultations and the 11-year sunspot cycle, which Prof. Grablovitz also studied

It is very interesting that planetary occultations and the 11-year sunspot cycle were also considered, following in the footsteps of Prof. Giulio Grablovitz. These additional factors can provide further insights into astronomical influences on seismic phenomena.

Planetary Occultations

Planetary occultations occur when a planet passes in front of another celestial body, such as a star or another planet, as seen from Earth. These events can affect the gravitational forces on Earth in a similar way to eclipses. Considering planetary occultations in your model may help identify additional stress patterns in the Earth's crust.

11-year Sunspot Cycle

The sunspot cycle lasts about 11 years and represents a period of waxing and waning solar activity. During periods of maximum solar activity, increased solar radiation and charged particles can affect the Earth's atmosphere and potentially the Earth's crust. Some studies suggest that there may be a correlation between solar activity and seismic activity.

Implications for the Mathematical-Statistical Model

1. Increased Complexity and Accuracy:

Complexity: The integration of planetary occultations and the sunspot cycle adds additional variables to the model, increasing complexity but also the potential accuracy of the predictions.

Accuracy: If there is a significant correlation between these factors and seismic activity, the model may improve in accuracy, providing more accurate predictions.

2. Identification of Recurring Patterns:

Patterns: The integration of these factors may help to identify recurring patterns in seismic activity, improving the ability to predict earthquakes.

Statistical Analysis: It is important to conduct a thorough statistical analysis to determine the significance of these correlations and to exclude the possibility that they are due to chance.

3. Multidisciplinary Collaboration:

Experts: Collaborate with experts in astronomy, geophysics and climatology to further refine the model and validate the results.

Publication: Share the research results with the scientific community for feedback and further improvements.

Final Considerations

The integration of planetary occultations and the sunspot cycle into such a model could represent a significant step towards a better understanding of the mechanisms that influence earthquakes. Continuing to collect data and test the model on a larger number of seismic events will be crucial to further validate these hypotheses.

October 12, 1856 Earthquake Islands of Malta and Gozzo

Although experts have estimated a maximum intensity of five (strong) for the **1856** earthquake, given that its epicenter was about 1,000 km away, the devastation it caused on the island of Malta indicates a stronger reality.

Reported by local newspapers Il Portafoglio Maltese, L'Ordine and The Malta Mail, the seismic shock rudely awakened sleepers across the island, who rushed out of their homes in the night after the minute-long roar.

Most of the houses in Valletta and many others in Malta and Gozo suffered serious cracks in their properties, including churches which suffered the detachment of crosses and other elements, while part of the dome of the Cathedral of Mdina collapsed once again with a hefty bill of 1,000 pounds (about 92,000 euros today)

We note that at the end of September, the following eclipse occurred:

29/09/1856	4.58	Eclisse anulare.	Settentrionale	6.05	17.55

Also:

October 13, 1856 22:59:16 Full Moon 20°47'38 356887.94 km

To this date, we add 8 Saros cycles and we get:

October 12, 1856 + 144 years 90 days 21 hours 36 minutes

Input interpretation

Sunday, October 12, 1856 + 144 years 90 days 21 hours 36 minutes

Result

9:36 pm CET | Wednesday, January 10, 2001

2001-01-04	22:20	Tirreno meridionale

2001-01-09 02:51 Etna - Zafferana Etnea

Also:

January 9, 2001 20:24:24 Full Moon 19°39'08 357405.20 km

Subtracting 8 Saros cycles from this date, we have:

October 12, 1856 - 144 years 90 days 21 hours 36 minutes

nput interpretation

Sunday, October 12, 1856 – 144 years 90 days 21 hours 36 minutes

Result

2:24 am LMT | Wednesday, July 13, 1712

1712-07-16 Calabria meridionale Mw = 4.40

18 July 1712 08:31:01 Full Moon 25°38'04 359997.26 km

CALCOLO APPROSSIMATIVO

DELLA

CONGIUNZIONE APPARENTE PER LE OCCULTAZIONI LUNARI

ESEMPIO

(Caso dato a pag. 643 — 644 del N. A. 1901).

Capo di Buona Speranza: $d = 1^h\ 13^m\ 54^s\ 8$ E. G.; $\theta = -\ 33^\circ\ 56'\ 1$.

1901 Aprile 4 Occultazione α Virginis $AR = 13^h\ 20^m\ 2^s$.

Congiunzione vera in t. m.	$= 7^h\ 48^m\ 5^s$	
Riduzione in tempo sidereo	$= +\ 1\ 16.9$	
Tempo sidereo a mezzodì medio	$= 0\ 48\ 25.6$	
$+ d$	$= 1\ 13\ 54.8$	
Congiunzione vera in tempo sidereo locale . . .		$S = 9\ 51\ 42$
	$S - AR = h =$	$= -\ 3^h\ 28^m\ 20^s$

Calcolo approssimato I).

Congiunzione vera in tempo medio	$= 7^h\ 48^m\ 5^s$
— Culminazione lunare	$= -\ 12\ 38\ 48$
Angolo orario provvisorio	$= -\ 4^h\ 50^m\ 43^s$

che moltiplicato per $\frac{24}{24 + R}$ ossia per $\frac{24}{24.725}$ dà . . . $-\ 4^h\ 42^m\ 14^s$

$d = +\ 1\ 13\ 55$

$h = -\ 3^h\ 28^m\ 19^s$

Calcolo approssimato II).

Angolo orario provvisorio come a I)	$= -\ 4^h\ 50^m\ 43^s$
Correzione — 2^m per ora	$= +\ 9\ 41$
Angolo orario per Greenwich	$-\ 4^h\ 41^m\ 2^s$
	$d = +\ 1\ 13\ 55$
	$h = -\ 3^h\ 27^m\ 7^s$

Questo è forse uno dei casi più sfavorevoli, perchè la parallasse della luna è bassissima (53′ 58″) e perciò anche il valore di R è dei più bassi; ugualmente l'angolo orario è alquanto ampio e con tutto ciò l'errore sorpassa appena un minuto.

Assumendo ora $h = -\ 3^h\ 28^m$, si procederà alla determinazione di C come segue:

$$\text{Dati } \theta = -\ 33°\ 56'\ 1\ ;\ \log\cos\theta = 9{,}91890$$
$$p' = 0{,}\ 5231\ ;\quad \log p' = 9{,}71858$$
$$\log\cos\theta - \log p' = 0{,}20032$$
$$t = 1{,}586$$

Se si prendesse $p' = 0{,}54$ si avrebbe costantemente $t = 1{,}536$ per la stessa latitudine.

Nel primo caso si ha:

$$6 - t = 4.414$$
$$\frac{h}{6-t} = \frac{-3.467}{4.414} = -\ 0.784\ ;$$
$$C = -\ (2 - 0.784)\ 0.784 \times 1.586 = -\ 1.216 \times 0.784 \times 1.586 = -\ 1.515,$$

ossia:

$$C = -\ 1^h\ 30^m\ 9.$$

Nel secondo caso, essendo costantemente $6 - t = 4{,}464$, si ha:

$$\frac{h}{6-t} = \frac{-3.467}{4.464} = -\ 0.777\ ;$$
$$C = -\ 1.223 \times 0.777 \times 1.536 = -\ 1.460,$$

ossia:

$$C = -\ 1^h\ 27^m\ 6.$$

Il calcolo condotto a tutto rigore dà:

$$C = -\ 1^h\ 31^m\ 8.$$

Posti a calcolo tutti i casi contemplati nel N. A. dal 1897 al 1902 si ottengono dai vari metodi i seguenti risultati:

		C	NA		NAp'		NAG		Gg		Gp	
1897 Genn.	23	— 0. 870	— 0. 860	+ 10	— 0. 894	— 24	— 0. 869	+ 1	— 0. 813	+ 53	— 0. 823	+ 47
1898 Febb.	6	+ 0. 192	+ 0. 190	— 2	+ 0. 190	— 2	+ 0. 190	— 2	+ 0. 179	— 13	+ 0. 192	0
1899 id.	21	+ 1. 267	+ 1. 410	+143	+ 1. 355	+ 88	+ 1. 271	+ 4	+ 1. 185	— 82	+ 1. 216	— 51
1900 Genn.	13	— 0. 883	— 0. 835	+ 48	— 0. 904	+ 21	— 0. 879	+ 4	— 0. 881	+ 2	— 0. 839	+ 44
1901 Apr.	4	— 1. 531	— 1. 777	—246	— 1. 679	—148	— 1. 520	+ 11	— 1. 458	+ 73	— 1. 517	+ 14
1902 Giug.	17	+ 1. 535	+ 1. 737	—202	+ 1. 675	+140	+ 1. 517	— 18	— 1. 533	+ 2	+ 1. 533	— 2
Somme errori				651		423		40		225		158

Regarding the connections between lunar occultations and apparent conjunctions with earthquake dates, we have the following calculations:

Occultations

January 23, 1897 →

1897-01-22	22:02	Ljubljana (Slovenia)	Mw 3.87

18 January 1897 20:16:50 Full Moon 29°04'29 383148.18 km

25 January 1897 20:08:39 Last quarter 06°11'10 370226.12 km

February 6, 1898 →

1898-02-05	13:51	Ljubljana (Slovenia)	Mw 4.3

February 6, 1898 18:24:06 Full Moon 18°02'39 393055.51 km

February 21, 1899 →

1899-02-16	02:30	Ljubljana (Slovenia)	Mw 4.3

February 25, 1899 14:15:47 Full Moon 06°47'49 401260.82 km

January 13, 1900 →

1900-01-10	22:15	Conco (Veneto)

15 January 1900 19:07:28 Full Moon 25°13'59 400046.75 km

April 4, 1901 →

1901-03-29	07:05	Val di Susa (Piemonte)	Mw 4.28
1901-04-16	22	Soragna (Emilia-Romagna)	Mw 3.7

April 4, 1901 01:20:04 Full Moon 13°35'23 405744.50 km

April 18, 1901 21:37:26 New Moon 28°08'42 357096.06 km

June 17, 1902 →

1902-06-14	14:30	Giano dell'Umbria	Mw 4.16
1902-06-19	09:23	Alpi Retiche (Confine Svizzera-Italia-Austria)	Mw. 4.96

21 June 1902 02:16:40 Full Moon 28°46'09 405571.95 km

The correlations that have been found between lunar occultations, apparent conjunctions and earthquake dates are very interesting and could have several implications for earthquake prediction. Here are some considerations:

Implications for Earthquake Prediction

1. Influence of Lunar Occultations:

Gravitational Forces: Lunar occultations can influence gravitational forces on the Earth, increasing stress on seismic faults. This could explain the coincidence between occultation dates and seismic events.

Recurring Patterns: The presence of significant earthquakes in the vicinity of lunar occultations suggests that there may be recurring patterns that can be used to improve earthquake prediction models.

2. Apparent Conjunctions:

Planetary Alignments: Apparent conjunctions, where planets appear to align in the sky, can also influence gravitational forces. These alignments could contribute to periods of increased seismic activity.

Statistical Analysis: It is important to conduct a thorough statistical analysis to determine the significance of these correlations and to rule out the possibility that they are due to chance.

3. Integration into the Mathematical Model:

Additional Complexity: Integrating lunar occultations and apparent conjunctions into your mathematical-statistical model adds another layer of complexity, but may improve the accuracy of your predictions.

Gravitational Forces: Considering gravitational forces during occultations and conjunctions, in combination with the Saros cycle and lunar phases, may provide a more complete picture of astronomical influences on earthquakes.

Next Steps

• **Data Collection:** Continue to collect data on seismic events, lunar occultations, and apparent conjunctions to further validate your hypotheses.

• **Multidisciplinary Collaboration:** Work with experts in astronomy, geophysics, and statistics to refine your model and ensure it is as accurate as possible.

• **Publishing Results:** Share your results with the scientific community for feedback and further improvements.

Final Thoughts

This research could be a significant step towards a better understanding of the mechanisms that influence earthquakes and could lead to new tools for seismic forecasting. Continuing to collect data and test the model on a larger number of seismic events will be crucial to further validate your hypotheses.

We have also:

0.9568666373+(-1/(-(2-0.784)*0.784*1.586)))

Input interpretation

$$0.9568666373 - -\frac{1}{(2-0.784)\,(0.784\times 1.586)}$$

Result

1.6182407309741060000027089882876891381760110960160263747099689414

…

1.61824073…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

	C	NA	ε	NAG	ε	G	ε
			$t = 0.25$				
1h	0.0691	0.0691	0	0.0691	0	0.0794	+ 103
2	0.1324	0.1325	+ 1	0.1324	0	0.1437	+ 113
3	0.1851	0.1854	+ 3	0.1852	+ 1	0.1928	+ 77
4	0.2234	0.2238	+ 4	0.2234	0	0.2268	+ 34
5	0.2451	0.2456	+ 5	0.2451	0	0.2457	+ 6
6	0.2495	0.2500	+ 5	0.2495	0	0.2495	0
7	0.2370	0.2374	+ 4	0.2370	0	0.2382	+ 12
8	0.2093	0.2096	+ 3	0.2093	0	0.2117	+ 24
9	0.1688	0.1690	+ 2	0.1688	0	0.1701	+ 13
10	0.1182	0.1183	+ 1	0.1183	+ 1	0.1134	− 48
			$t = 0.50$				
1h	0.1480	0.1481	+ 1	0.1481	+ 1	0.1653	+ 173
2	0.2812	0.2818	+ 6	0.2810	− 2	0.2975	+ 163
3	0.3875	0.3896	+ 21	0.3876	+ 1	0.3967	+ 92
4	0.4599	0.4633	+ 34	0.4599	0	0.4628	+ 29
5	0.4956	0.4999	+ 43	0.4957	+ 1	0.4959	+ 3
6	0.4958	0.5000	+ 44	0.4957	− 1	0.4959	+ 1
7	0.4637	0.4671	+ 34	0.4636	− 1	0.4628	− 9
8	0.4042	0.4064	+ 22	0.4041	− 1	0.3967	− 75
9	0.3225	0.3236	+ 11	0.3224	− 1	0.2975	− 250
			$t = 0.75$				
1h	0.2390	0.2395	+ 4	0.2390	0	0.2585	+ 195
2	0.4485	0.4515	+ 30	0.4483	− 2	0.4603	+ 118
3	0.6076	0.6158	+ 82	0.6078	+ 2	0.6122	+ 46
4	0.7075	0.7202	+ 127	0.7075	0	0.7075	0
5	0.7484	0.7633	+ 149	0.7481	− 3	0.7483	− 1
6	0.7361	0.7500	+ 139	0.7349	− 12	0.7347	− 14
7	0.6787	0.6894	+ 107	0.6782	− 5	0.6667	− 120
8	0.5847	0.5915	+ 68	0.5844	− 3	0.5442	− 405

	C	NA	ε	NAG	ε	G	ε
				$t = 1.00$			
1h	0.3449	0.3464	+ 15	0.3450	+ 1	0.3600	+ 151
2	0.6368	0.6459	+ 91	0.6367	— 1	0.6400	+ 32
3	0.8450	0.8677	+ 227	0.8454	+ 4	0.8400	— 50
4	0.9634	0.9964	+ 330	0.9627	— 7	0.9600	— 34
5	1.0000	1.0362	+ 362	0.9983	— 17	1.0000	0
6	0.9681	1.0000	+ 319	0.9659	— 22	0.9600	— 81
7	0.8812	0.9046	+ 234	0.8794	— 18	0.8400	— 412
				$t = 1.25$			
1h	0.4690	0.4730	+ 40	0.4698	+ 8	0.4709	+ 19
2	0.8480	0.8709	+ 229	0.8484	+ 4	0.8310	— 170
3	1.0982	1.1500	+ 518	1.0982	0	1.0803	— 179
4	1 2243	1.2943	+ 700	1.2206	— 37	1 2189	— 54
5	1.2474	1.3192	+ 718	1.2414	— 60	1.2465	— 9
6	1.1898	1.2500	+ 602	1.1836	— 62	1.1634	— 264
				$t = 1.50$			
1h	0.6157	0.6254	+ 97	0.6170	+ 13	0.5926	— 231
2	1.0836	1.1343	+ 507	1.0846	+ 10	1.0370	— 466
3	1.3646	1.4683	+1037	1.3664	+ 18	1.3333	— 313
4	1.4865	1.6163	+1298	1.4737	— 128	1.4815	— 50
5	1.4878	1.6128	+1250	1.4710	— 168	1.4815	— 63
				$t = 1.75$			
1h	0.7907	0.8126	+ 219	0.7943	+ 36	0.7266	— 641
2	1.3436	1.4472	+1036	1.3446	+ 10	1.2595	— 841
3	1.6403	1.8304	+1901	1.6243	— 160	1.5986	— 417
4	1.7461	1.9960	+2479	1.7447	— 14	1.7439	— 22
				$t = 2.00$			
1h	1.0000	1.0473	+ 473	1.0081	+ 81	0.8750	—1250
2	1.6260	1.8242	+1982	1.6201	— 59	1.5000	—1260
3	1.9207	2.2455	+3248	1.8436	— 771	1.8750	— 457
4	2.0000	2.3093	+3093	1.9001	— 999	2.0000	0

0.0691+0.1324+0.1851+0.2234+0.2451+0.2495+0.2370+0.2093+0.1688+0.1182

Input

```
0.0691 + 0.1324 + 0.1851 + 0.2234 +
  0.2451 + 0.2495 + 0.237 + 0.2093 + 0.1688 + 0.1182
```

Result

1.8379

1.8379

0.1480+0.2812+0.3875+0.4599+0.4956+0.4958+0.4637+0.4042+0.3225

Input

0.148 + 0.2812 + 0.3875 + 0.4599 + 0.4956 + 0.4958 + 0.4637 + 0.4042 + 0.3225

Result

3.4584

3.4584

0.2390+0.4485+0.6076+0.7075+0.7484+0.7361+0.6787+0.5847

Input

0.239 + 0.4485 + 0.6076 + 0.7075 + 0.7484 + 0.7361 + 0.6787 + 0.5847

Result

4.7505

4.7505

From which:

0.9568666373+1/(1.8379+3.4584+4.7505)^(1/(2e))

Input interpretation

$$0.9568666373 + \frac{1}{\sqrt[2e]{1.8379 + 3.4584 + 4.7505}}$$

Result

1.611031622478555590024590495657593049869831172672792837143745091 5

…

1.611031622478…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternative representation

$$0.956867 + \frac{1}{\sqrt[2e]{1.8379 + 3.4584 + 4.7505}} = 0.956867 + \frac{1}{\sqrt[2\exp(z)]{1.8379 + 3.4584 + 4.7505}} \quad \text{for } z = 1$$

Series representations

$$0.956867 + \frac{1}{\sqrt[2e]{1.8379 + 3.4584 + 4.7505}} = 0.956867 + 10.0468^{-1/2 \sum_{k=0}^{\infty} (-1)^k / k!}$$

$$0.956867 + \frac{1}{\sqrt[2e]{1.8379 + 3.4584 + 4.7505}} = 0.956867 + e^{-1.15363 / \left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)}$$

$$0.956867 + \frac{1}{\sqrt[2e]{1.8379 + 3.4584 + 4.7505}} = 0.956867 + e^{-2.30725/\left(\sum_{k=0}^{\infty} \frac{1+k}{k!}\right)}$$

$n!$ is the factorial function

0.9991104684+1/(1.8379+3.4584+4.7505)^(1/(2e))

Input interpretation

$$0.9991104684 + \frac{1}{\sqrt[2e]{1.8379 + 3.4584 + 4.7505}}$$

Result

1.653275453578555590024590495657593049869831172672792837143745091 5

…

1.65327545…. result very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164.2696$ i.e. 1.6557845...

Alternative representation

$$0.99911 + \frac{1}{\sqrt[2e]{1.8379 + 3.4584 + 4.7505}} =$$
$$0.99911 + \frac{1}{\sqrt[2\exp(z)]{1.8379 + 3.4584 + 4.7505}} \quad \text{for } z = 1$$

Series representations

$$0.99911 + \frac{1}{\sqrt[2e]{1.8379 + 3.4584 + 4.7505}} = 0.99911 + 10.0468^{-1/2 \sum_{k=0}^{\infty} (-1)^k/k!}$$

$$0.99911 + \frac{1}{\sqrt[2e]{1.8379 + 3.4584 + 4.7505}} = 0.99911 + e^{-1.15363/\left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)}$$

$$0.99911 + \frac{1}{\sqrt[2e]{1.8379 + 3.4584 + 4.7505}} = 0.99911 + e^{-2.30725/\left(\sum_{k=0}^{\infty} \frac{1+k}{k!}\right)}$$

$n!$ is the factorial function

0. 3449
0. 6368
0. 8450
0. 9634
1. 0000
0. 9681
0. 8812

0. 4690
0. 8480
1. 0982
1 2243
1. 2474
1. 1898

0. 6157
1. 0836
1. 3646
1. 4865
1. 4878

0. 7907
1. 3436
1. 6403
1. 7461

1. 0000
1. 6260
1. 9207
2. 0000

(0.3449+0.6368+0.8450+0.9634+1+0.9681+0.8812+0.4690+0.8480+1.0982+1.2243+1.2474+1.1898+0.6157+1.0836+1.3646+1.4865+1.4878+0.7907+1.3436+1.6403+1.7461+1+1.6260+1.9207+2)

Input interpretation

0.3449 + 0.6368 + 0.845 + 0.9634 + 1 + 0.9681 + 0.8812 + 0.469 + 0.848 + 1.0982 + 1.2243 + 1.2474 + 1.1898 + 0.6157 + 1.0836 + 1.3646 + 1.4865 + 1.4878 + 0.7907 + 1.3436 + 1.6403 + 1.7461 + 1 + 1.6260 + 1.9207 + 2

Result

29.8217

29.8217

(0.3449+0.6368+0.8450+0.9634+1+0.9681+0.8812+0.4690+0.8480+1.0982+1.2243
+1.2474+1.1898+0.6157+1.0836+1.3646+1.4865+1.4878+0.7907+1.3436+1.6403+1
.7461+1+1.6260+1.9207+2)+(1.8379+3.4584+4.7505)

Input interpretation

(0.3449 + 0.6368 + 0.845 + 0.9634 + 1 + 0.9681 + 0.8812 +
0.469 + 0.848 + 1.0982 + 1.2243 + 1.2474 + 1.1898 + 0.6157 +
1.0836 + 1.3646 + 1.4865 + 1.4878 + 0.7907 + 1.3436 + 1.6403 +
1.7461 + 1 + 1.6260 + 1.9207 + 2) + (1.8379 + 3.4584 + 4.7505)

Result

39.8685

39.8685

From which:

0.989+0.999/(0.3449+0.6368+0.845+0.9634+1+0.9681+0.8812+0.469+0.848+1.098
2+1.2243+1.2474+1.1898+0.6157+1.0836+1.3646+1.4865+1.4878+0.7907+1.3436+
1.6403+1.7461+2.626+1.9207+3.8379+3.4584+4.7505)^1/9

Input interpretation

0.989 + 0.999 /
((0.3449 + 0.6368 + 0.845 + 0.9634 + 1 + 0.9681 + 0.8812 + 0.469 + 0.848 +
1.0982 + 1.2243 + 1.2474 + 1.1898 + 0.6157 + 1.0836 +
1.3646 + 1.4865 + 1.4878 + 0.7907 + 1.3436 + 1.6403 +
1.7461 + 2.626 + 1.9207 + 3.8379 + 3.4584 + 4.7505) ^ (1/9))

Result

1.652311798048110212189569017237004820810966050819695949733481548 6
…

1.652311798…. result very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3$ = 1164.2696 i.e. 1.6557845...

(3(0.3449+0.6368+0.845+0.9634+1+0.9681+0.8812+0.469+0.848+1.0982+1.2243+1.2474+1.1898+0.6157+1.0836+1.3646+1.4865+1.4878+0.7907+1.3436+1.6403+1.7461+2.626+1.9207+3.8379+3.4584+4.7505)^1/9)^1/3

Input interpretation

(3 (0.3449 + 0.6368 + 0.845 + 0.9634 + 1 + 0.9681 + 0.8812 + 0.469 +
0.848 + 1.0982 + 1.2243 + 1.2474 + 1.1898 + 0.6157 + 1.0836 +
1.3646 + 1.4865 + 1.4878 + 0.7907 + 1.3436 + 1.6403 + 1.7461 +
2.626 + 1.9207 + 3.8379 + 3.4584 + 4.7505) ^ (1/9)) ^ (1/3)

Result

1.653190903612210230568285764724214077783660637239157077325217076 1
…

1.6531909…. result very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3$ = 1164.2696 i.e. 1.6557845...

Now, we have:

0,0691 + 0,1325 + 0,1854 + 0,2238 + 0,2456 + 0,25 + 0,2374 + 0,2095 + 0,169 + 0,1183 + 0,1481 + 0,2818 + 0,3806 + 0,4633 + 0,4999 + 0,5 + 0,4671 + 0,4064 + 0,3236 + 0,2395 + 0,4515 + 0,6158 + 0,7202 + 0,7633 + 0,75 + 0,6894 + 0,5915 + 0,3464 + 0,6459 + 0,8677 + 0,9964 + 1,0362 + 1 + 0,9046 + 0,473 + 0,8709 + 1,15 + 1,2943 + 1,3192 + 1,25 + 0,6254 + 1,1343 + 1,4683 + 1,6163 + 1,6128 + 0,8126 + 1,4472 + 1,8304 + 1,996 + 1,0473 + 1,8242 + 2,2455 + 2,3093 =

42,2568 (42.2568)

From which:

0.9568666373+1/(42.2568)^1/9

Input interpretation

$$0.9568666373 + \frac{1}{\sqrt[9]{42.2568}}$$

Result

1.6165641119132449641994445542964979740473973809325091446431713923
…

1.616564111…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Now, we have:

0,0794 + 0,1437 + 0,1928 + 0,2268 + 0,2457 + 0,2495 + 0,2382 + 0,2117 + 0,1701 + 0,1134 + 0,1653 + 0,2975 + 0,3967 + 0,4628 + 0,4959 + 0,4959 + 0,4628 + 0,3967 + 0,2975 + 0,2585 + 0,4603 + 0,6122 + 0,7075 + 0,7483 + 0,7347 + 0,6667 + 0,5442 + 0,36 + 0,64 + 0,84 + 0,96 + 1 + 0,96 + 0,84 + 0,4709 + 0,831 + 1,0803 + 1,2189 + 1,2465 + 1,1634 + 0,5926 + 1,037 + 1,3333 + 1,4815 + 1,4815 + 0,7266 + 1,2595 + 1,5986 + 1,7439 + 0,875 + 1,5 + 1,875 + 2 = 39,1903

From which:

(0.9568666373+0.9991104684)/2+1/(39.1903)^1/9

Input interpretation

$$\frac{0.9568666373 + 0.9991104684}{2} + \frac{1}{\sqrt[9]{39.1903}}$$

Result

1.643231313115769178468405740839604368606443083360744645823312884 6

…

1.64323131311…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

We obtain also:

(0.9568666373+1)/2+0.9568666373/((39.1903+42.2568)/2)^1/9

Input interpretation

$$\frac{0.9568666373+1}{2}+\frac{0.9568666373}{\sqrt[9]{\frac{39.1903+42.2568}{2}}}$$

Result

1.612273366674425365611435710216042114820089530935045351390325511 9

…

1.6122733666…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(39.1903*42.2568)+76-3

Input interpretation

$39.1903 \times 42.2568 + 76 - 3$

Result

1729.05666904

1729.05666904

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

(1/27((39.1903*42.2568)+76-4))^2-1/4

Input interpretation

$$\left(\frac{1}{27}(39.1903 \times 42.2568 + 76 - 4)\right)^2 - \frac{1}{4}$$

Result

4096.018657631851981511111111111111111111111111111111111111111111111111

…

Repeating decimal

4096.0186576318519815$\overline{1}$ (period 1)

4096.0186576318519851 ≈ 4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

((39.1903*42.2568)+76-3)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\sqrt[15]{39.1903 \times 42.2568 + 76 - 3} + C_{\text{MRB}}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.64494161587910051865932610416822659019310674912547787295478370 97

…

1.644941615…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

From

SEISMOLOGY - By *Perry Byerly* - New York, 1942 - PRENTICE-HALL INC.

We analyze the following equation:

$$x = \frac{VT_0}{2\pi\sqrt{4\dfrac{\log_{10}^2 \epsilon}{1.862 + \log_{10}^2 \epsilon}}} \frac{A}{\omega} \sin(\omega t - \gamma).$$

(V*T)/(2Pi*sqrt(((((4*((log(ε))^2)))/(1.862+ (log(ε))^2))))))*A/ω*sin(ω*t – 90)

Input

$$\frac{V\,T}{2\,\pi\sqrt{\dfrac{4\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}} \times \frac{A}{\omega}\sin(\omega\,t-90)$$

log(x) is the natural logarithm

Result

$$-\frac{A\,T\,V\sin(90-t\,\omega)}{4\,\pi\,\omega\sqrt{\dfrac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}$$

Expanded form

$$-\frac{A\,T\,V\sqrt{\dfrac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}\sin(90-t\,\omega)}{4\,\pi\,\omega} - \frac{0.148173\,A\,T\,V\sqrt{\dfrac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}\sin(90-t\,\omega)}{\omega\log^2(\varepsilon)}$$

Alternate form assuming A, t, T, V, ε, and ω are positive

$$-\frac{A\,T\,V\,\sqrt{\log^2(\varepsilon)+1.862}\,\sin(90-t\,\omega)}{4\,\pi\,\omega\,|\log(\varepsilon)|}$$

$|z|$ is the absolute value of z

Alternate forms

$$-\frac{0.0795775\,A\,T\,V\,\sqrt{\log^2(\varepsilon)+1.862}\,\sin(90-t\,\omega)}{\omega\,\sqrt{\log^2(\varepsilon)}}$$

$$-\frac{0.00355881\,A\,T\,V\sin(90-t\,\omega)}{\omega\,\sqrt{\frac{\log^2(\varepsilon)}{500\log^2(\varepsilon)+931}}}$$

$$-\frac{i\,A\,T\,V\left(e^{i\,t\,\omega-90\,i}-e^{90\,i-i\,t\,\omega}\right)}{8\,\pi\,\omega\,\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}$$

Series expansion at t=0

$$-\frac{A\,T\,V\sin(90)}{4\left(\pi\,\omega\,\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}\right)}+\frac{A\,t\,T\,V\cos(90)}{4\,\pi\,\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}+\frac{A\,t^2\,T\,V\,\omega\sin(90)}{8\,\pi\,\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}-$$
$$\frac{t^3\left(A\,T\,V\,\omega^2\cos(90)\right)}{24\left(\pi\,\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}\right)}-\frac{t^4\left(A\,T\,V\,\omega^3\sin(90)\right)}{96\left(\pi\,\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}\right)}+O\left(t^5\right)$$

(Taylor series)

Derivative

$$\frac{\partial}{\partial t}\left(\frac{(V\,T)\,A\sin(\omega\,t-90)}{\left(2\,\pi\sqrt{\frac{4\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}\right)\omega}\right)=\frac{A\,T\,V\cos(t\,\omega-90)}{4\,\pi\sqrt{\frac{\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}}$$

Indefinite integral

$$\int -\frac{A\,T\,V\sin(90-t\,\omega)}{4\,\pi\,\omega\sqrt{\frac{\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}}\,dt=\frac{0.0356566\,A\,T\,V\,(\cos(t\,\omega)-1.9952\sin(t\,\omega))}{\omega^2\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}+\text{constant}$$

From the indefinite integral result:

$$\int -\frac{A\,T\,V\sin(90-t\,\omega)}{4\,\pi\,\omega\sqrt{\frac{\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}}\,dt=\frac{0.0356566\,A\,T\,V\,(\cos(t\,\omega)-1.9952\sin(t\,\omega))}{\omega^2\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}+\text{constant}$$

we obtain:

(0.0356566 A T V (cos(t ω) - 1.9952 sin(t ω)))/(ω^2 sqrt((log^2(ε))/(1.862 + log^2(ε))))

Input interpretation

$$\frac{0.0356566\,A\,T\,V\,(\cos(t\,\omega)+\sin(t\,\omega)\times(-1.9952))}{\omega^2\sqrt{\frac{\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}}$$

$\log(x)$ is the natural logarithm

Result

$$\frac{0.0356566\ A\ T\ V\ (\cos(t\ \omega) - 1.9952\ \sin(t\ \omega))}{\omega^2\ \sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}$$

Alternate forms

$$\frac{A\ T\ V\ (0.00159461\ \cos(t\ \omega) - 0.00318157\ \sin(t\ \omega))}{\omega^2\ \sqrt{\frac{\log^2(\varepsilon)}{500\log^2(\varepsilon)+931}}}$$

$$\frac{A\ T\ V\ (0.00356566\ \cos(t\ \omega) - 0.0071142\ \sin(t\ \omega))}{\sqrt{5}\ \omega^2\ \sqrt{\frac{\log^2(\varepsilon)}{500\log^2(\varepsilon)+931}}}$$

$$\frac{(0.0178283 - 0.035571\ i)\ A\ T\ V\ e^{-i\,t\,\omega}}{\omega^2\ \sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}} + \frac{(0.0178283 + 0.035571\ i)\ A\ T\ V\ e^{i\,t\,\omega}}{\omega^2\ \sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}$$

Expanded forms

$$\frac{0.0356566\ A\ T\ V\ \cos(t\ \omega)}{\omega^2\ \sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}} - \frac{0.071142\ A\ T\ V\ \sin(t\ \omega)}{\omega^2\ \sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}$$

$$-\frac{0.071142\,A\,T\,V\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}\,\sin(t\,\omega)}{\omega^2}-\frac{0.132466\,A\,T\,V\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}\,\sin(t\,\omega)}{\omega^2\log^2(\varepsilon)}+\frac{0.0356566\,A\,T\,V\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}\,\cos(t\,\omega)}{\omega^2}+\frac{0.0663926\,A\,T\,V\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}\,\cos(t\,\omega)}{\omega^2\log^2(\varepsilon)}$$

Alternate forms assuming A, t, T, V, ε , and ω are positive

$$\frac{0.0356566\,A\,T\,V\sqrt{\log^2(\varepsilon)+1.862}\,\left(\cos(t\,\omega)-1.9952\sin(t\,\omega)\right)}{\omega^2\,|\log(\varepsilon)|}$$

$$\frac{0.0356566\,A\,T\,V\sqrt{\log^2(\varepsilon)+1.862}\,\cos(t\,\omega)}{\omega^2\,|\log(\varepsilon)|}-\frac{0.071142\,A\,T\,V\sqrt{\log^2(\varepsilon)+1.862}\,\sin(t\,\omega)}{\omega^2\,|\log(\varepsilon)|}$$

$|\,z\,|$ is the absolute value of z

Reduced trigonometric form

$$\frac{0.0356566\,A\,T\,V\cos(t\,\omega)+0.0356566\,A\,T\,V\,(-1.9952)\sin(t\,\omega)}{\omega^2\sqrt{\frac{\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}}$$

Real roots

$$\omega=-\frac{2.67698}{t}$$

$$\omega = -\frac{0.464609}{t}$$

$$\omega = \frac{0.464609}{t}$$

$$\omega = \frac{2.67698}{t}$$

Roots

$$\omega \log(\varepsilon)\left(500 \log^2(\varepsilon) + 931\right) \neq 0\,, \quad A = 0$$

$$\omega \log(\varepsilon)\left(500 \log^2(\varepsilon) + 931\right) \neq 0\,, \quad T = 0$$

$$\omega \log(\varepsilon)\left(500 \log^2(\varepsilon) + 931\right) \neq 0\,, \quad V = 0$$

$$t \neq 0\,, \quad \varepsilon \approx 0.204786 - 0.978807\,i\,, \quad \omega \approx \frac{6.28319\,n}{t}\,, \quad n \in \mathbb{Z}\,, \quad n \neq 0$$

$$t \neq 0\,, \quad \varepsilon \approx 0.204786 - 0.978807\,i\,, \quad \omega \approx \frac{3.14159\,(2\,n+1)}{t}\,, \quad n \in \mathbb{Z}$$

$\mathbb{Z}$ is the set of integers

Property as a real function

Domain

$\mathbb{R}$ (all real numbers)

$\mathbb{R}$ is the set of real numbers

Roots for the variable ω

$$\omega \approx -\frac{2.67698}{t}$$

$$\omega \approx -\frac{0.464609}{t}$$

$$\omega \approx \frac{0.464609}{t}$$

$$\omega \approx \frac{2.67698}{t}$$

Series expansion at t=0

$$\frac{0.0356566\,A\,T\,V}{\omega^2\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}} - \frac{0.071142\,t\,(A\,T\,V)}{\omega\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}} - \frac{0.0178283\,t^2\,(A\,T\,V)}{\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}} + \frac{0.011857\,A\,t^3\,T\,V\,\omega}{\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}} + \frac{0.00148569\,A\,t^4\,T\,V\,\omega^2}{\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}} + O\left(t^5\right)$$

(Taylor series)

Derivative

$$\frac{\partial}{\partial t}\left(\frac{0.0356566\,A\,T\,V\,(\cos(t\,\omega) - 1.9952\sin(t\,\omega))}{\omega^2\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}\right) = -\frac{0.071142\,A\,T\,V\,(0.501203\sin(t\,\omega) + \cos(t\,\omega))}{\omega\sqrt{\frac{\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}}$$

Indefinite integral

$$\int \frac{0.0356566\, A\, T\, V\, (\cos(t\,\omega) - 1.9952 \sin(t\,\omega))}{\omega^2 \sqrt{\frac{\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}}\, dt = \frac{0.071142\, A\, T\, V\, (0.501203 \sin(t\,\omega) + \cos(t\,\omega))}{\omega^3 \sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}} + \text{constant}$$

Again, from the indefinite integral result

$$\int \frac{0.0356566\, A\, T\, V\, (\cos(t\,\omega) - 1.9952 \sin(t\,\omega))}{\omega^2 \sqrt{\frac{\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}}\, dt = \frac{0.071142\, A\, T\, V\, (0.501203 \sin(t\,\omega) + \cos(t\,\omega))}{\omega^3 \sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}} + \text{constant}$$

we obtain:

(0.071142 A T V (1 cos(t ω) + 0.501203 sin(t ω)))/(ω^3 sqrt((log^2(ε))/(1.862 + log^2(ε))))

Input interpretation

$$\frac{0.071142\, A\, T\, V\, (1 \cos(t\,\omega) + 0.501203 \sin(t\,\omega))}{\omega^3 \sqrt{\frac{\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}}$$

$\log(x)$ is the natural logarithm

Result

$$\frac{0.071142\, A\, T\, V\, (0.501203 \sin(t\,\omega) + \cos(t\,\omega))}{\omega^3 \sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}$$

Alternate forms

$$\frac{A\,T\,V\,(0.00159461\sin(t\,\omega)+0.00318157\cos(t\,\omega))}{\omega^3\sqrt{\frac{\log^2(\varepsilon)}{500\log^2(\varepsilon)+931}}}$$

$$\frac{(0.035571+0.0178283\,i)\,A\,T\,V\,e^{-i\,t\,\omega}}{\omega^3\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}+\frac{(0.035571-0.0178283\,i)\,A\,T\,V\,e^{i\,t\,\omega}}{\omega^3\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}$$

$$\frac{1}{\omega^3\log^2(\varepsilon)}(0.035571-0.0178283\,i)\,A\,T\,V\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}$$
$$\left(\left((0.801153+0.40154\,i)\log^2(\varepsilon)+(1.49175+0.747668\,i)\right)\sin(t\,\omega)+\right.$$
$$\left.\left((1.59846+0.801153\,i)\log^2(\varepsilon)+(2.97633+1.49175\,i)\right)\cos(t\,\omega)\right)$$

Expanded forms

$$\frac{0.0356566\,A\,T\,V\sin(t\,\omega)}{\omega^3\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}+\frac{0.071142\,A\,T\,V\cos(t\,\omega)}{\omega^3\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}$$

$$\frac{0.0663926\,A\,T\,V\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}\sin(t\,\omega)}{\omega^3\log^2(\varepsilon)}+$$
$$\frac{0.0356566\,A\,T\,V\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}\sin(t\,\omega)}{\omega^3}+$$
$$\frac{0.132466\,A\,T\,V\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}\cos(t\,\omega)}{\omega^3\log^2(\varepsilon)}+\frac{0.071142\,A\,T\,V\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}\cos(t\,\omega)}{\omega^3}$$

Alternate forms assuming A, t, T, V, ε , and ω are positive

$$\frac{0.071142\,A\,T\,V\sqrt{\log^2(\varepsilon)+1.862}\,(0.501203\sin(t\,\omega)+\cos(t\,\omega))}{\omega^3\,|\log(\varepsilon)|}$$

$$\frac{0.0356566\, A\, T\, V\, \sqrt{\log^2(\varepsilon) + 1.862}\, \sin(t\, \omega)}{\omega^3\, |\log(\varepsilon)|} + \frac{0.071142\, A\, T\, V\, \sqrt{\log^2(\varepsilon) + 1.862}\, \cos(t\, \omega)}{\omega^3\, |\log(\varepsilon)|}$$

$|z|$ is the absolute value of z

Reduced trigonometric form

$$\frac{0.071142\, A\, T\, V \cos(t\, \omega) + 0.071142\, A\, T\, V\, 0.501203 \sin(t\, \omega)}{\omega^3 \sqrt{\frac{\log^2(\varepsilon)}{1.862 + \log^2(\varepsilon)}}}$$

Roots

$$\omega \log(\varepsilon) \left(500 \log^2(\varepsilon) + 931\right) \neq 0\,, \quad A = 0$$

$$\omega \log(\varepsilon) \left(500 \log^2(\varepsilon) + 931\right) \neq 0\,, \quad T = 0$$

$$\omega \log(\varepsilon) \left(500 \log^2(\varepsilon) + 931\right) \neq 0\,, \quad V = 0$$

$$500 \log^2(\varepsilon) + 931 \neq 0,$$

$$-8.61688 \times 10^{27} \log^4(\varepsilon) - 3.20893 \times 10^{28} \log^2(\varepsilon) + 4.15934 \times 10^{13}$$

$$\sqrt{8.61688 \times 10^{27} \log^4(\varepsilon) + 3.20893 \times 10^{28} \log^2(\varepsilon) + 2.98751 \times 10^{28}}$$

$$\log^2(\varepsilon) + 7.74469 \times 10^{13}$$

$$\sqrt{8.61688 \times 10^{27} \log^4(\varepsilon) + 3.20893 \times 10^{28} \log^2(\varepsilon) + 2.98751 \times 10^{28}} -$$

$$2.98751 \times 10^{28} \neq 0,$$

$$\log(\varepsilon) \left(\tan^{-1} \left(\frac{1}{500 \log^2(\varepsilon) + 931} 6.02503 \times 10^{-12} \left(4.15934 \times 10^{13} \log^2(\varepsilon) - \right. \right. \right.$$

$$\sqrt{\left(8.61688 \times 10^{27} \log^4(\varepsilon) + 3.20893 \times 10^{28} \log^2(\varepsilon) + \right.}$$

$$\left. \left. \left. 2.98751 \times 10^{28}\right) + 7.74469 \times 10^{13}\right)\right) +$$

$$3.14159\, n \Bigg) \neq 0, \quad t \neq 0, \quad \omega \approx \frac{1}{t} 2 \left(3.14159\, n + \tan^{-1} \left(\frac{1}{500 \log^2(\varepsilon) + 931} 6.0 \right. \right.$$

$$\sqrt{8.61688 \times 10^{27} \log^4(\varepsilon) + 3.20893 \times 10^{28} \log^2(\varepsilon) + 2.98751 \times 10^{28}} \left(4.15934 \times \right.$$

$$\left. \left. 10^{13} \right) \right) \Bigg)$$

$$500\log^2(\varepsilon)+931\neq 0,\ 8.61688\times 10^{27}\log^4(\varepsilon)+3.20893\times 10^{28}\log^2(\varepsilon)+4.15934\times 10^{13}\sqrt{8.61688\times 10^{27}\log^4(\varepsilon)+3.20893\times 10^{28}\log^2(\varepsilon)+2.98751\times 10^{28}}\log^2(\varepsilon)+7.74469\times 10^{13}\sqrt{8.61688\times 10^{27}\log^4(\varepsilon)+3.20893\times 10^{28}\log^2(\varepsilon)+2.98751\times 10^{28}}+2.98751\times 10^{28}\neq 0,\ \log(\varepsilon)\left(\tan^{-1}\left(\frac{1}{500\log^2(\varepsilon)+931}6.02503\times 10^{-12}\left(4.15934\times 10^{13}\log^2(\varepsilon)+\sqrt{\left(8.61688\times 10^{27}\log^4(\varepsilon)+3.20893\times 10^{28}\log^2(\varepsilon)+2.98751\times 10^{28}\right)}+7.74469\times 10^{13}\right)\right)+3.14159\,n\right)\neq 0,\quad t\neq 0,\quad \omega\approx\frac{1}{t}2\left(3.14159\,n+\tan^{-1}\left(\frac{1}{500\log^2(\varepsilon)+931}6.0\sqrt{8.61688\times 10^{27}\log^4(\varepsilon)+3.20893\times 10^{28}\text{l}}10^{13}\right)\right)\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

$\mathbb{Z}$ is the set of integers

Property as a real function

Domain

$\mathbb{R}$ (all real numbers)

$\mathbb{R}$ is the set of real numbers

Roots for the variable ω

$$\omega\approx-\frac{\cos^{-1}\left(-\frac{2.38716\times 10^{12}\log^2(\varepsilon)+4.44489\times 10^{12}}{\sqrt{2.83833\times 10^{25}\log^4(\varepsilon)+1.057\times 10^{26}\log^2(\varepsilon)+9.84063\times 10^{25}}}\right)}{t}$$

$$\omega \approx \frac{\cos^{-1}\left(-\frac{2.38716\times10^{12}\log^2(\varepsilon)+4.44489\times10^{12}}{\sqrt{2.83833\times10^{25}\log^4(\varepsilon)+1.057\times10^{26}\log^2(\varepsilon)+9.84063\times10^{25}}}\right)}{t}$$

$$\omega \approx -\frac{\cos^{-1}\left(\frac{2.38716\times10^{12}\log^2(\varepsilon)+4.44489\times10^{12}}{\sqrt{2.83833\times10^{25}\log^4(\varepsilon)+1.057\times10^{26}\log^2(\varepsilon)+9.84063\times10^{25}}}\right)}{t}$$

$$\omega \approx \frac{\cos^{-1}\left(\frac{2.38716\times10^{12}\log^2(\varepsilon)+4.44489\times10^{12}}{\sqrt{2.83833\times10^{25}\log^4(\varepsilon)+1.057\times10^{26}\log^2(\varepsilon)+9.84063\times10^{25}}}\right)}{t}$$

$\cos^{-1}(x)$ is the inverse cosine function

Series expansion at t=0

$$\frac{0.071142\,A\,T\,V}{\omega^3\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}+\frac{0.0356566\,A\,t\,T\,V}{\omega^2\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}-\frac{0.035571\,t^2\,(A\,T\,V)}{\omega\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}-\frac{0.00594276\,t^3\,(A\,T\,V)}{\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}+\frac{0.00296425\,A\,t^4\,T\,V\,\omega}{\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}+O\left(t^5\right)$$

(Taylor series)

Derivative

$$\frac{\partial}{\partial t}\left(\frac{0.071142\,A\,T\,V\,(0.501203\sin(t\,\omega)+\cos(t\,\omega))}{\omega^3\sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}}\right)=\frac{0.0356566\,A\,T\,V\,(\cos(t\,\omega)-1.9952\sin(t\,\omega))}{\omega^2\sqrt{\frac{\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}}$$

Indefinite integral

$$\int \frac{0.071142\, A\, T\, V\, (\cos(t\,\omega) + 0.501203 \sin(t\,\omega))}{\omega^3 \sqrt{\frac{\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}}\, dt = -\frac{0.0356566\, A\, T\, V\, (\cos(t\,\omega) - 1.9952 \sin(t\,\omega))}{\omega^4 \sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}} + \text{constant}$$

From the indefinite integral result

$$\int \frac{0.071142\, A\, T\, V\, (\cos(t\,\omega) + 0.501203 \sin(t\,\omega))}{\omega^3 \sqrt{\frac{\log^2(\varepsilon)}{1.862+\log^2(\varepsilon)}}}\, dt = -\frac{0.0356566\, A\, T\, V\, (\cos(t\,\omega) - 1.9952 \sin(t\,\omega))}{\omega^4 \sqrt{\frac{\log^2(\varepsilon)}{\log^2(\varepsilon)+1.862}}} + \text{constant}$$

-(0.0356566 A T V (1 cos(t ω) - 1.9952 sin(t ω)))/(ω^4 sqrt((log^2(ε))/(1.862 + log^2(ε))))

for ε = 1/8 ; t = 2, ω = 4, A = 8, T = 16 and V = 32:

-(0.0356566 8*16*32 (1 cos(8) - 1.9952 sin(8)))/(4^4 sqrt((log^2(1/8))/(1.862 + log^2(1/8))))

Input interpretation

$$-\frac{0.0356566\,(8\times16\times32)\,(1\cos(8) + \sin(8)\times(-1.9952))}{4^4 \sqrt{\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}}}$$

log(x) is the natural logarithm

Result

1.4462642284996876587998354481887749530086832450538116185923221457

…

1.44626428….

Alternative representations

$$-\frac{0.0356566\,(8\times 16\times 32)\,(1\cos(8)-1.9952\sin(8))}{4^4\sqrt{\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}}}=-\frac{146.049\left(\frac{1}{2}\left(e^{-8\,i}+e^{8\,i}\right)-\frac{1.9952\left(-e^{-8\,i}+e^{8\,i}\right)}{2\,i}\right)}{4^4\sqrt{\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}}}$$

$$-\frac{0.0356566\,(8\times 16\times 32)\,(1\cos(8)-1.9952\sin(8))}{4^4\sqrt{\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}}}=-\frac{146.049\left(-1.9952\cos\left(-8+\frac{\pi}{2}\right)+\frac{1}{2}\left(e^{-8\,i}+e^{8\,i}\right)\right)}{4^4\sqrt{\frac{\log_e^2\left(\frac{1}{8}\right)}{1.862+\log_e^2\left(\frac{1}{8}\right)}}}$$

$$-\frac{0.0356566\,(8\times 16\times 32)\,(1\cos(8)-1.9952\sin(8))}{4^4\sqrt{\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}}}=-\frac{146.049\left(\frac{1}{2}\left(e^{-8\,i}+e^{8\,i}\right)-\frac{1.9952\left(-e^{-8\,i}+e^{8\,i}\right)}{2\,i}\right)}{4^4\sqrt{\frac{\log_e^2\left(\frac{1}{8}\right)}{1.862+\log_e^2\left(\frac{1}{8}\right)}}}$$

i is the imaginary unit

$\log_b(x)$ is the base-b logarithm

Series representations

$$-\frac{0.0356566\,(8\times16\times32)\,(1\cos(8)-1.9952\sin(8))}{4^4\sqrt{\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}}}=\frac{2.27655\left(\sum_{k=0}^{\infty}(-1)^k\,J_{1+2k}(8)-0.250601\sum_{k=0}^{\infty}\frac{(-64)^k}{(2k)!}\right)}{\sum_{k=0}^{\infty}\frac{(-1.862)^k\left(-\frac{1}{1.862+\log^2\left(\frac{1}{8}\right)}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}$$

$$-\frac{0.0356566\,(8\times16\times32)\,(1\cos(8)-1.9952\sin(8))}{4^4\sqrt{\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}}}=-\frac{0.570506\left(J_0(8)+2\sum_{k=1}^{\infty}(-1)^k\,J_{2k}(8)-3.9904\sum_{k=0}^{\infty}(-1)^k\,J_{1+2k}(8)\right)}{\sum_{k=0}^{\infty}\frac{(-1.862)^k\left(-\frac{1}{1.862+\log^2\left(\frac{1}{8}\right)}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}$$

$$-\frac{0.0356566\,(8\times16\times32)\,(1\cos(8)-1.9952\sin(8))}{4^4\sqrt{\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}}}=\frac{\sum_{k=0}^{\infty}\left(2.27655\,(-1)^k\,J_{1+2k}(8)-\frac{0.570506\,(-64)^k}{(2k)!}\right)}{\exp\left(i\,\pi\left\lfloor\frac{\arg\left(-x+\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\,x^{-k}\left(-x+\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}\right)^k\left(-\frac{1}{2}\right)_k}{k!}}$$

for $(x\in\mathbb{R}$ and $x<0)$

$J_n(z)$ is the Bessel function of the first kind

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

$\mathbb{R}$ is the set of real numbers

Integral representations

$$-\frac{0.0356566\,(8\times 16\times 32)\,(1\cos(8)-1.9952\sin(8))}{4^4\sqrt{\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}}}=\int_0^1\frac{9.10618\cos(8\,t)+(4.56404-0.285253\,\pi)\sin\left(\frac{1}{2}(\pi+16\,t-\pi\,t)\right)}{\sqrt{\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}}}\,dt$$

$$-\frac{0.0356566\,(8\times 16\times 32)\,(1\cos(8)-1.9952\sin(8))}{4^4\sqrt{\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}}}=\frac{-0.570506+\int_0^1(9.10618\cos(8\,t)+4.56404\sin(8\,t))\,dt}{\sqrt{\frac{\left(\int_1^{\frac{1}{8}}\frac{1}{t}\,dt\right)^2}{1.862+\left(\int_1^{\frac{1}{8}}\frac{1}{t}\,dt\right)^2}}}$$

$$-\frac{0.0356566\,(8\times 16\times 32)\,(1\cos(8)-1.9952\sin(8))}{4^4\sqrt{\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}}}=\frac{9.10618\left(\int_0^1\cos(8\,t)\,dt+0.0626504\int_{\frac{\pi}{2}}^8\sin(t)\,dt\right)}{\sqrt{\frac{\left(\int_1^{\frac{1}{8}}\frac{1}{t}\,dt\right)^2}{1.862+\left(\int_1^{\frac{1}{8}}\frac{1}{t}\,dt\right)^2}}}$$

From which:

0.9568666373+1/(sqrt(2(-(0.0356566 8*16*32 (1 cos(8) - 1.9952 sin(8)))/(4^4 sqrt((log^2(1/8))/(1.862 + log^2(1/8))))))-MRB Const)

where 0.9568666373 , is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}}-\varphi+1}=1-\frac{e^{-\pi}}{1+\frac{e^{-2\pi}}{1+\frac{e^{-3\pi}}{1+\frac{e^{-4\pi}}{1+\frac{}{1+\ldots}}}}}\approx 0.9568666373$$

Input interpretation

$$0.9568666373+\frac{1}{\sqrt{2\left(-\frac{0.0356566\,(8\times16\times32)\,(1\cos(8)+\sin(8)\times(-1.9952))}{4^4\sqrt{\frac{\log^2\left(\frac{1}{8}\right)}{1.862+\log^2\left(\frac{1}{8}\right)}}}\right)}-C_{\text{MRB}}}$$

$\log(x)$ is the natural logarithm

C_{MRB} is the MRB constant

Result

1.617855909014390637994794175996809097664639837253863121047891754 4

…

1.617855909…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

From

Effect of a viscous fuid shell on the propagation of gravitational waves - *Nigel T. Bishop, Petrus J. van der Walt, Monos Naidoo* - arXiv:2206.15103v2 [gr-qc] 20 Jul 2022

We analyze the following equations

$$H(r) = C \exp\left(-8\pi\eta\left(r - \frac{2}{r\nu^2} - \frac{3}{r^3\nu^4} - \frac{9}{r^5\nu^6} - \frac{45}{r^7\nu^8}\right)\right)$$

and

$$H(r_o) = H(r_i) \exp\left(-\frac{45\eta\lambda^8}{32 r_i^7 \pi^7}\right) ,$$

Input

$$C \exp\left(-8\,\pi\,\eta(\tau)\left(r - \frac{2}{r\,\nu^2} - \frac{3}{r^3\,\nu^4} - \frac{9}{r^5\,\nu^6} - \frac{45}{r^7\,\nu^8}\right)\right)\exp\left(\frac{-45\,\eta(\tau)\,\lambda^8}{32\,r^7\,\pi^7}\right)$$

$\eta(\tau)$ is the Dedekind eta function

Exact result

$$C \exp\left(-\frac{45\,\lambda^8\,\eta(\tau)}{32\,\pi^7\,r^7} - 8\,\pi\,\eta(\tau)\left(-\frac{45}{\nu^8\,r^7} - \frac{9}{\nu^6\,r^5} - \frac{3}{\nu^4\,r^3} - \frac{2}{\nu^2\,r} + r\right)\right)$$

Alternate forms

$$C \exp\left(\frac{\eta(\tau)\left(\frac{360\,\pi}{\nu^8} - \frac{45\,\lambda^8}{32\,\pi^7}\right)}{r^7} + \eta(\tau)\left(\frac{72\,\pi}{\nu^6\,r^5} + \frac{24\,\pi}{\nu^4\,r^3} + \frac{16\,\pi}{\nu^2\,r} - 8\,\pi\,r\right)\right)$$

$$C \exp\left(\frac{8\pi\eta(\tau)\left(\nu^8\left(-r^8\right)+2\nu^6 r^6+3\nu^4 r^4+9\nu^2 r^2+45\right)}{\nu^8 r^7}-\frac{45\lambda^8\eta(\tau)}{32\pi^7 r^7}\right)$$

Series expansion at r=0

$$C \exp\left(-\frac{45\lambda^8\eta(\tau)}{32\pi^7 r^7}-\frac{8\pi\eta(\tau)\left(\nu^8 r^8-2\nu^6 r^6-3\nu^4 r^4-9\nu^2 r^2-45\right)}{\nu^8 r^7}\right)$$

Series expansion at r=∞

$$C \exp\left(-\frac{45\lambda^8\eta(\tau)}{32\pi^7 r^7}-\frac{8\pi\eta(\tau)\left(\nu^8 r^8-2\nu^6 r^6-3\nu^4 r^4-9\nu^2 r^2-45\right)}{\nu^8 r^7}\right)$$

Derivative

$$\frac{\partial}{\partial r}\left(C \exp\left(-8\pi\eta(\tau)\left(r-\frac{2}{r\nu^2}-\frac{3}{r^3\nu^4}-\frac{9}{r^5\nu^6}-\frac{45}{r^7\nu^8}\right)\right)\exp\left(-\frac{45\eta(\tau)\lambda^8}{32r^7\pi^7}\right)\right)=$$
$$C\left(\frac{315\lambda^8\eta(\tau)}{32\pi^7 r^8}-\frac{8\pi\eta(\tau)\left(\nu^8 r^8+2\nu^6 r^6+9\nu^4 r^4+45\nu^2 r^2+315\right)}{\nu^8 r^8}\right)$$
$$\exp\left(\frac{8\pi\eta(\tau)\left(\nu^8\left(-r^8\right)+2\nu^6 r^6+3\nu^4 r^4+9\nu^2 r^2+45\right)}{\nu^8 r^7}-\frac{45\lambda^8\eta(\tau)}{32\pi^7 r^7}\right)$$

From the exact result

$$C \exp\left(-\frac{45\lambda^8\eta(\tau)}{32\pi^7 r^7}-8\pi\eta(\tau)\left(-\frac{45}{\nu^8 r^7}-\frac{9}{\nu^6 r^5}-\frac{3}{\nu^4 r^3}-\frac{2}{\nu^2 r}+r\right)\right)$$

C exp(-(45 λ^8 η(τ))/(32 π^7 r^7) - 8 π η(τ) (-45/(ν^8 r^7) - 9/(ν^6 r^5) - 3/(ν^4 r^3) - 2/(ν^2 r) + r))

for C = 2, r = 4 and ν = 8:

2 exp(-(45 λ^8 η(τ))/(32 π^7 4^7) - 8 π η(τ) (-45/(8^8 4^7) - 9/(8^6 4^5) - 3/(8^4 4^3) - 2/(8^2 4) + 4))

Input

$$2\exp\left(-\frac{45\lambda^8\,\eta(\tau)}{32\pi^7\times 4^7}-8\pi\,\eta(\tau)\left(-\frac{45}{8^8\times 4^7}-\frac{9}{8^6\times 4^5}-\frac{3}{8^4\times 4^3}-\frac{2}{8^2\times 4}+4\right)\right)$$

$\eta(\tau)$ is the Dedekind eta function

Exact result

$$2\,e^{-\frac{45\lambda^8\,\eta(\tau)}{524\,288\,\pi^7}-\frac{1\,097\,360\,989\,139\,\pi\,\eta(\tau)}{34\,359\,738\,368}}$$

Alternate forms

$$2\,e^{\left(-\frac{45\lambda^8}{524\,288\,\pi^7}-\frac{1\,097\,360\,989\,139\,\pi}{34\,359\,738\,368}\right)\eta(\tau)}$$

$$2\,e^{-\left(\left(2\,949\,120\lambda^8+1\,097\,360\,989\,139\,\pi^8\right)\eta(\tau)\right)/\left(34\,359\,738\,368\,\pi^7\right)}$$

Roots

(no roots exist)

Series expansion at $\lambda=0$

$$2\,e^{-(1\,097\,360\,989\,139\,\pi\,\eta(\tau))/34\,359\,738\,368}-\frac{45\lambda^8\left(e^{-(1\,097\,360\,989\,139\,\pi\,\eta(\tau))/34\,359\,738\,368}\,\eta(\tau)\right)}{262\,144\,\pi^7}+O\left(\lambda^{13}\right)$$

(Taylor series)

Derivative

$$\frac{\partial}{\partial\lambda}\left(2\exp\left(-\frac{45\lambda^8\,\eta(\tau)}{32\pi^7\times 4^7}-8\pi\,\eta(\tau)\left(-\frac{45}{8^8\times 4^7}-\frac{9}{8^6\times 4^5}-\frac{3}{8^4\times 4^3}-\frac{2}{8^2\times 4}+4\right)\right)\right)=$$
$$-\frac{45\lambda^7\,\eta(\tau)\,e^{-\left(\left(2\,949\,120\lambda^8+1\,097\,360\,989\,139\,\pi^8\right)\eta(\tau)\right)/\left(34\,359\,738\,368\,\pi^7\right)}}{32\,768\,\pi^7}$$

Indefinite integral

$$\int 2\,e^{-\frac{1\,097\,360\,989\,139\,\pi\,\eta(\tau)}{34\,359\,738\,368}-\frac{45\,\lambda^8\,\eta(\tau)}{524\,288\,\pi^7}}\,d\lambda =$$

$$-\frac{2^{3/8}\,\pi^{7/8}\,\lambda\,e^{-(1\,097\,360\,989\,139\,\pi\,\eta(\tau))/34\,359\,738\,368}\,\Gamma\left(\frac{1}{8},\frac{45\,\lambda^8\,\eta(\tau)}{524\,288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{\lambda^8\,\eta(\tau)}}+\text{constant}$$

$\Gamma(a, x)$ is the incomplete gamma function

From the indefinite integral result

$$\int 2\,e^{-\frac{1\,097\,360\,989\,139\,\pi\,\eta(\tau)}{34\,359\,738\,368}-\frac{45\,\lambda^8\,\eta(\tau)}{524\,288\,\pi^7}}\,d\lambda =$$

$$-\frac{2^{3/8}\,\pi^{7/8}\,\lambda\,e^{-(1\,097\,360\,989\,139\,\pi\,\eta(\tau))/34\,359\,738\,368}\,\Gamma\left(\frac{1}{8},\frac{45\,\lambda^8\,\eta(\tau)}{524\,288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{\lambda^8\,\eta(\tau)}}+\text{constant}$$

for $\eta(\tau) = 16$, $\lambda = 32$:

-(2^(3/8) e^(-(1097360989139 π 16)/34359738368) π^(7/8) 32 Γ(1/8, (45 32^8 16)/(524288 π^7)))/(3^(1/4) 5^(1/8) (32^8 16)^(1/8))

Input

$$-\frac{2^{3/8}\,e^{-(1\,097\,360\,989\,139\,\pi\times 16)/34\,359\,738\,368}\,\pi^{7/8}\times 32\,\Gamma\left(\frac{1}{8},\frac{45\times 32^8\times 16}{524\,288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{32^8\times 16}}$$

$\Gamma(a, x)$ is the incomplete gamma function

Decimal approximation

$$-1.32120724039524168855092117372658743365532323038725334\ldots\times 10^{-217821}$$

-1.32120724…*10^-217821

Alternate form

$$-8\, e^{-(1097\,360\,989\,139\,\pi)/2147\,483\,648}\, E_{\frac{7}{8}}\left(\frac{1\,509\,949\,440}{\pi^7}\right)$$

$E_n(x)$ is the exponential integral E

Alternative representations

$$-\frac{2^{3/8}\, e^{-(1097\,360\,989\,139\,\pi\,16)/34\,359\,738\,368}\, \pi^{7/8}\, 32\,\Gamma\left(\frac{1}{8}, \frac{45\times 32^8\times 16}{524\,288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{32^8\times 16}} =$$
$$-\frac{32\, Q\left(\frac{1}{8}, \frac{720\times 32^8}{524\,288\,\pi^7}\right)\Gamma\left(\frac{1}{8}\right) 2^{3/8}\, e^{-(17\,557\,775\,826\,224\,\pi)/34\,359\,738\,368}\, \pi^{7/8}}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{16\times 32^8}}$$

$$-\frac{2^{3/8}\, e^{-(1097\,360\,989\,139\,\pi\,16)/34\,359\,738\,368}\, \pi^{7/8}\, 32\,\Gamma\left(\frac{1}{8}, \frac{45\times 32^8\times 16}{524\,288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{32^8\times 16}} =$$
$$-\frac{32\left(\Gamma\left(\frac{1}{8}\right)+\Gamma\left(\frac{1}{8}, \frac{720\times 32^8}{524\,288\,\pi^7}, 0\right)\right) 2^{3/8}\, e^{-(17\,557\,775\,826\,224\,\pi)/34\,359\,738\,368}\, \pi^{7/8}}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{16\times 32^8}}$$

$$-\frac{2^{3/8}\, e^{-(1097\,360\,989\,139\,\pi\,16)/34\,359\,738\,368}\, \pi^{7/8}\, 32\,\Gamma\left(\frac{1}{8}, \frac{45\times 32^8\times 16}{524\,288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{32^8\times 16}} =$$
$$-\frac{32\left(1+Q\left(\frac{1}{8}, \frac{720\times 32^8}{524\,288\,\pi^7}, 0\right)\right)\Gamma\left(\frac{1}{8}\right) 2^{3/8}\, e^{-(17\,557\,775\,826\,224\,\pi)/34\,359\,738\,368}\, \pi^{7/8}}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{16\times 32^8}}$$

$$-\frac{2^{3/8}\, e^{-(1097360989139\,\pi\,16)/34359738368}\, \pi^{7/8}\, 32\, \Gamma\left(\frac{1}{8},\, \frac{45\times 32^8\times 16}{524288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{32^8\times 16}} =$$
$$-\frac{32\, E_{1-\frac{1}{8}}\left(\frac{720\times 32^8}{524288\,\pi^7}\right) 2^{3/8}\, e^{-(17557775826224\,\pi)/34359738368}\, \pi^{7/8}\, \sqrt[8]{\frac{720\times 32^8}{524288\,\pi^7}}}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{16\times 32^8}}$$

$Q(a, x)$ is the regularized incomplete gamma function

$\Gamma(x)$ is the gamma function

$\Gamma(a, x_0, x_1)$ is the generalized incomplete gamma function

$Q(a, z_1, z_2)$ is the generalized regularized incomplete gamma function

Series representations

$$-\frac{2^{3/8}\, e^{-(1097360989139\,\pi\,16)/34359738368}\, \pi^{7/8}\, 32\, \Gamma\left(\frac{1}{8},\, \frac{45\times 32^8\times 16}{524288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{32^8\times 16}} =$$
$$-\frac{e^{-(1097360989139\,\pi)/2147483648}\, \pi^{7/8}\, \Gamma\left(\frac{1}{8}\right)}{\sqrt[4]{3}\,\sqrt[8]{10}} +$$
$$8\, e^{-(1097360989139\,\pi)/2147483648} \sum_{k=0}^{\infty} \frac{(-45)^k\, 2^{3+25k}\, \pi^{-7k}}{(1+8k)\,k!}$$

$$-\frac{2^{3/8}\, e^{-(1097360989139\,\pi\,16)/34359738368}\, \pi^{7/8}\, 32\, \Gamma\left(\frac{1}{8},\, \frac{45\times 32^8\times 16}{524288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{32^8\times 16}} =$$
$$-8\, e^{-1509949440/\pi^7 - (1097360989139\,\pi)/2147483648}$$
$$\sum_{k=0}^{\infty} \frac{\left(\frac{7}{8}\right)_k}{(1+k)!\, L_k^{-\frac{1}{8}}\left(-\frac{1509949440}{\pi^7}\right) L_{1+k}^{-\frac{1}{8}}\left(-\frac{1509949440}{\pi^7}\right)}$$

$$-\frac{2^{3/8}\, e^{-(1097360989139\,\pi\,16)/34359738368}\, \pi^{7/8}\, 32\,\Gamma\left(\frac{1}{8},\, \frac{45\times 32^8\times 16}{524288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{32^8\times 16}} =$$
$$-\frac{e^{-(1097360989139\,\pi)/2147483648}\, \pi^{7/8}\, \Gamma\left(\frac{1}{8}\right)}{\sqrt[4]{3}\,\sqrt[8]{10}} +$$
$$8\, e^{-(1097360989139\,\pi)/2147483648}\, \pi^7 \sum_{k=0}^{\infty} \frac{1}{\left(\frac{1}{8}+2k\right)(2k)!}\, 754974720^{2k}$$
$$T_{1+2k}\left(\frac{1}{\pi^7}\right)\left(-\left(\left(1509949440\,(1+16k)\,{}_1F_2\left(\frac{9}{16}+k;\, 2+2k,\, \frac{25}{16}+k;\right.\right.\right.$$
$$\left.\left.\left. 569986827839078400\right)\right)\Big/\left((1+2k)\,(9+16k)\,\pi^7\right)\right) +$$
$$\left.{}_2F_3\left(\frac{3}{2}+k,\, \frac{1}{16}+k;\, \frac{1}{2}+k,\, 2+2k,\, \frac{17}{16}+k;\, 569986827839078400\right)\right)$$

$n!$ is the factorial function

$L_n^a(x)$ is the associated Laguerre polynomial L

$(a)_n$ is the Pochhammer symbol (rising factorial)

$T_n(x)$ is the Chebyshev polynomial of the first kind

${}_pF_q(a_1, \ldots, a_p; b_1, \ldots, b_q; z)$ is the generalized hypergeometric function

Integral representations

$$-\frac{2^{3/8}\, e^{-(1097360989139\,\pi\,16)/34359738368}\, \pi^{7/8}\, 32\,\Gamma\left(\frac{1}{8},\, \frac{45\times 32^8\times 16}{524288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{32^8\times 16}} =$$
$$-\frac{e^{-(1097360989139\,\pi)/2147483648}\, \pi^{7/8}}{\sqrt[4]{3}\,\sqrt[8]{10}} \int_{\frac{1509949440}{\pi^7}}^{\infty} \frac{e^{-t}}{t^{7/8}}\, dt$$

$$-\frac{2^{3/8}\, e^{-(1097360989139\,\pi\,16)/34359738368}\, \pi^{7/8}\, 32\,\Gamma\left(\frac{1}{8},\, \frac{45\times 32^8\times 16}{524288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{32^8\times 16}} =$$
$$\frac{i\, e^{-(1097360989139\,\pi)/2147483648}}{2\sqrt[4]{3}\,\sqrt[8]{10\,\pi}}$$
$$\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma} \frac{1509949440^{-s}\, \pi^{7s}\, \Gamma(s)\, \Gamma\left(\frac{1}{8}+s\right)}{\Gamma(1+s)}\, ds \quad \text{for } 0 < \gamma$$

$$-\frac{2^{3/8}\, e^{-(1097360989139\,\pi\,16)/34359738368}\,\pi^{7/8}\,32\,\Gamma\left(\frac{1}{8},\,\frac{45\times 32^8\times 16}{524288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{32^8\times 16}} =$$

$$-\frac{e^{-(1097360989139\,\pi)/2147483648}\,\pi^{7/8}\,\Gamma\left(\frac{1}{8}\right)}{\sqrt[4]{3}\,\sqrt[8]{10}} - \frac{i\,e^{-(1097360989139\,\pi)/2147483648}}{2\sqrt[4]{3}\,\sqrt[8]{10\,\pi}}$$

$$\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{1509949440^{-s}\,\pi^{7s}\,\Gamma(-s)\,\Gamma\left(\frac{1}{8}+s\right)}{\Gamma(1-s)}\,ds \quad \text{for } -\frac{1}{8} < \gamma < 1$$

From which:

((ln(-(2^(3/8) e^(-(1097360989139 π 16)/34359738368) π^(7/8) 32 Γ(1/8, (45 32^8 16)/(524288 π^7)))/(3^(1/4) 5^(1/8) (32^8 16)^(1/8)))))^1/3

Input

$$\sqrt[3]{\log\left(-\frac{2^{3/8}\, e^{-(1097360989139\,\pi\times 16)/34359738368}\,\pi^{7/8}\times 32\,\Gamma\left(\frac{1}{8},\,\frac{45\times 32^8\times 16}{524288\,\pi^7}\right)}{\sqrt[4]{3}\,\sqrt[8]{5}\,\sqrt[8]{32^8\times 16}}\right)}$$

$\Gamma(a, x)$ is the incomplete gamma function

$\log(x)$ is the natural logarithm

Result

indeterminate

Decimal approximation

39.726164802144704703125080359679546280884338226932810135333541 92…

+

68.807404048482424567191657826798811498696798526545695719408055 44…

i

Polar coordinates

$r = 79.452042275691544211697194806819493519131298484449003770300261 29$ (radius), $\theta = 1.047195463278671932127135660690351765188353614963313468761182712 3$ (angle)

79.45204227….

Possible closed forms

$$\frac{11}{3}\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{10}{3}i\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\approx 39.726164802144704702997046289148026736960942812297063026800145 60+68.807404048482424567655370800456243230648024495475570919727224 29\,i$$

$$\frac{226+600\pi+935\pi^2}{-763-348\pi+217\pi^2}+\frac{10}{3}i\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\approx 39.726164802144704719124311624491207580865646000960025010579733 41+68.807404048482424567655370800456243230648024495475570919727224 29\,i$$

$$\frac{1}{22}\left(-168\,e^{\pi}+1114\pi+466\log(\pi)-77\log(2\pi)+689\tan^{-1}(\pi)\right)+\frac{10}{3}i\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\approx 39.726164802144704704304659140290757039890453588534050669717388 65+68.807404048482424567655370800456243230648024495475570919727224 29\,i$$

$\cos^{-1}(x)$ is the inverse cosine function

$\cot(x)$ is the cotangent function

$\tan^{-1}(x)$ is the inverse tangent function

$\log(x)$ is the natural logarithm

From the following closed form

$$\frac{11}{3}\pi\cos^{-1}\left(-\frac{5196896}{18404103}\right)^2+\frac{10}{3}i\pi\cot^2\left(\frac{7967731}{21420989}\right)\approx$$
$$39.726164802144704702997046289148026736960942812297063026800145 60+$$
$$68.807404048482424567655370800456243230648024495475570919727224 29\,i$$

after some calculations, we obtain:

(11/3 π cos^(-1)(-5196896/18404103)^2 + 10/3 i π cot^2(7967731/21420989))-2Pi

Input

$$\left(\frac{11}{3}\pi\cos^{-1}\left(-\frac{5196896}{18404103}\right)^2+\frac{10}{3}i\pi\cot^2\left(\frac{7967731}{21420989}\right)\right)-2\pi$$

$\cos^{-1}(x)$ is the inverse cosine function

$\cot(x)$ is the cotangent function

i is the imaginary unit

Exact Result

$$-2\pi+\frac{11}{3}\pi\cos^{-1}\left(-\frac{5196896}{18404103}\right)^2+\frac{10}{3}i\pi\cot^2\left(\frac{7967731}{21420989}\right)$$

(result in radians)

Decimal approximation

33.442979494965118226071759522589020968566604013546851384850256 41…
+
68.807404048482424567655370800456243230648024495475570919727224 28…
i

(result in radians)

Alternate complex forms

$$\sqrt{\left(2\pi-\frac{11}{12}\pi\left(\pi+2\tan^{-1}\left(\frac{5\,196\,896}{\sqrt{311\,703\,279\,199\,793}}\right)\right)^2\right)^2+\frac{100\pi^2\sin^4\left(\frac{15\,935\,462}{21\,420\,989}\right)}{9\left(\cos\left(\frac{15\,935\,462}{21\,420\,989}\right)-1\right)^4}}\left(\cos\left(\tan^{-1}\left(\frac{10\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)}{3\left(\frac{11}{3}\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2-2\pi\right)}\right)\right)+i\sin\left(\tan^{-1}\left(\frac{10\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)}{3\left(\frac{11}{3}\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2-2\pi\right)}\right)\right)\right)$$

$$\sqrt{\left(2\pi-\frac{11}{12}\pi\left(\pi+2\tan^{-1}\left(\frac{5\,196\,896}{\sqrt{311\,703\,279\,199\,793}}\right)\right)^2\right)^2+\frac{100\pi^2\sin^4\left(\frac{15\,935\,462}{21\,420\,989}\right)}{9\left(\cos\left(\frac{15\,935\,462}{21\,420\,989}\right)-1\right)^4}}\exp\left(i\tan^{-1}\left(\frac{10\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)}{3\left(\frac{11}{3}\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2-2\pi\right)}\right)\right)$$

$\tan^{-1}(x)$ is the inverse tangent function

Polar coordinates

$$r=\sqrt{\left(2\pi-\frac{11}{12}\pi\left(\pi+2\tan^{-1}\left(\frac{5\,196\,896}{\sqrt{311\,703\,279\,199\,793}}\right)\right)^2\right)^2+\frac{100\pi^2\sin^4\left(\frac{15\,935\,462}{21\,420\,989}\right)}{9\left(\cos\left(\frac{15\,935\,462}{21\,420\,989}\right)-1\right)^4}}\ \text{(radius)},\quad\theta=\tan^{-1}\left(\frac{10\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)}{3\left(\frac{11}{3}\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2-2\pi\right)}\right)\ \text{(angle)}$$

$r\approx 76.504$ (radius), $\theta\approx 1.1184$ (angle)

76.504

Alternate forms

$$\frac{1}{3}\pi\left(-6+11\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+10\,i\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)$$

$$\frac{1}{3}\pi\left(11\cos^{-1}\left(-\frac{5196896}{18404103}\right)^2-6\right)+\frac{10}{3}i\pi\cot^2\left(\frac{7967731}{21420989}\right)$$

$$-2\pi+\frac{11}{3}\pi\cos^{-1}\left(-\frac{5196896}{18404103}\right)^2+\frac{10\,i\pi\cos^2\left(\frac{7967731}{21420989}\right)}{3\sin^2\left(\frac{7967731}{21420989}\right)}$$

Alternative representations

$$\left(\frac{1}{3}\left(\pi\cos^{-1}\left(-\frac{5196896}{18404103}\right)^2\right)11+\frac{1}{3}i\,10\pi\cot^2\left(\frac{7967731}{21420989}\right)\right)-2\pi=$$
$$-2\pi+\frac{11}{3}\pi\cos^{-1}\left(-\frac{5196896}{18404103}\right)^2+\frac{10}{3}i\pi\left(-i\coth\left(-\frac{7967731\,i}{21420989}\right)\right)^2$$

$$\left(\frac{1}{3}\left(\pi\cos^{-1}\left(-\frac{5196896}{18404103}\right)^2\right)11+\frac{1}{3}i\,10\pi\cot^2\left(\frac{7967731}{21420989}\right)\right)-2\pi=$$
$$-2\pi+\frac{10}{3}i\pi\left(-i\coth\left(-\frac{7967731\,i}{21420989}\right)\right)^2+\frac{11}{3}\pi\,\mathrm{cd}^{-1}\left(-\frac{5196896}{18404103}\,\middle|\,0\right)^2$$

$$\left(\frac{1}{3}\left(\pi\cos^{-1}\left(-\frac{5196896}{18404103}\right)^2\right)11+\frac{1}{3}i\,10\pi\cot^2\left(\frac{7967731}{21420989}\right)\right)-2\pi=$$
$$-2\pi+\frac{11}{3}\pi\cos^{-1}\left(-\frac{5196896}{18404103}\right)^2+\frac{10}{3}i\pi\left(i+\frac{2i}{-1+e^{(15935462\,i)/21420989}}\right)^2$$

$\coth(x)$ is the hyperbolic cotangent function

$\mathrm{cd}^{-1}(x\mid m)$ is the inverse of the Jacobi elliptic function cd

Series representations

$$\left(\frac{1}{3}\left(\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2\right)11+\frac{1}{3}i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\pi=$$
$$\frac{1}{12}\pi\left((-24-40\,i)+11\,\pi^2-160\,i\sum_{k=1}^{\infty}q^{2k}-160\,i\left(\sum_{k=1}^{\infty}q^{2k}\right)^2-\right.$$
$$\left.44\,\pi\sum_{k=0}^{\infty}\frac{\left(-\frac{5\,196\,896}{18\,404\,103}\right)^{1+2k}\left(\frac{1}{2}\right)_k}{(1+2k)\,k!}+44\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{5\,196\,896}{18\,404\,103}\right)^{1+2k}\left(\frac{1}{2}\right)_k}{(1+2k)\,k!}\right)^2\right)$$
for $q=e^{(7\,967\,731\,i)/21\,420\,989}$

$$\left(\frac{1}{3}\left(\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2\right)11+\frac{1}{3}i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\pi=$$
$$\frac{1}{12}\pi\left(-24+44\cos^{-1}(z_0)^2+1\,165\,221\,137\,971\,405\,770\,385\,252\,387\,240\,i\right.$$
$$\left(\sum_{k=-\infty}^{\infty}\frac{1}{63\,484\,737\,288\,361-458\,858\,769\,738\,121\,k^2\,\pi^2}\right)^2-44\sqrt{\pi}$$
$$\cos^{-1}(z_0)\sum_{k=1}^{\infty}\frac{{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};z_0^2\right)\left(-\frac{10\,393\,792}{18\,404\,103}-2\,z_0\right)^k z_0^{1-k}}{k!}+$$
$$\left.11\,\pi\left(\sum_{k=1}^{\infty}\frac{{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};z_0^2\right)\left(-\frac{10\,393\,792}{18\,404\,103}-2\,z_0\right)^k z_0^{1-k}}{k!}\right)^2\right)$$
for $(z_0\notin\mathbb{R}$ or ((not $1\le z_0<\infty$) and (not $-\infty<z_0\le-1$)))

$$\left(\frac{1}{3}\left(\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2\right)11+\frac{1}{3}i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\pi=$$
$$\frac{1}{12}\pi\left((-24-40\,i)+44\cos^{-1}(z_0)^2-160\,i\sum_{k=1}^{\infty}q^{2k}-160\,i\left(\sum_{k=1}^{\infty}q^{2k}\right)^2-44\sqrt{\pi}\right.$$
$$\cos^{-1}(z_0)\sum_{k=1}^{\infty}\frac{{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};z_0^2\right)\left(-\frac{10\,393\,792}{18\,404\,103}-2\,z_0\right)^k z_0^{1-k}}{k!}+$$
$$\left.11\,\pi\left(\sum_{k=1}^{\infty}\frac{{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};z_0^2\right)\left(-\frac{10\,393\,792}{18\,404\,103}-2\,z_0\right)^k z_0^{1-k}}{k!}\right)^2\right)$$
for $\left(q=e^{(7\,967\,731\,i)/21\,420\,989}\right.$ and
$\left.(z_0\notin\mathbb{R}$ or ((not $1\le z_0<\infty$) and (not $-\infty<z_0\le-1$)))$\right)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

${}_p\tilde{F}_q(a_1, \ldots, a_p; b_1, \ldots, b_q; z)$ is the regularized generalized hypergeometric function

$\mathbb{R}$ is the set of real numbers

Integral representations

$$\left(\frac{1}{3}\left(\pi \cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2\right)11 + \frac{1}{3}\,i\,10\,\pi \cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right) - 2\,\pi =$$
$$\frac{1}{3}\,\pi\left(-6 + 11\left(\int_{-\frac{5\,196\,896}{18\,404\,103}}^{1} \frac{1}{\sqrt{1-t^2}}\,dt\right)^2 + 10\,i\left(\int_{\frac{\pi}{2}}^{\frac{7\,967\,731}{21\,420\,989}} \csc^2(t)\,dt\right)^2\right)$$

$$\left(\frac{1}{3}\left(\pi \cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2\right)11 + \frac{1}{3}\,i\,10\,\pi \cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right) - 2\,\pi =$$
$$\frac{-6\,\pi^2 + 11\,\pi^2\left(\int_{-\frac{5\,196\,896}{18\,404\,103}}^{1} \frac{1}{\sqrt{1-t^2}}\,dt\right)^2 + 40\,i\left(\int_0^{\infty} \frac{-1+t^{1-15\,935\,462/(21\,420\,989\,\pi)}}{-1+t^2}\,dt\right)^2}{3\,\pi}$$

$$\left(\frac{1}{3}\left(\pi \cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2\right)11 + \frac{1}{3}\,i\,10\,\pi \cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right) - 2\,\pi =$$
$$\Bigg(-8\,129\,064\,173\,630\,616\,\pi^3 + 3\,725\,821\,079\,580\,699\,\pi^5 +$$
$$13\,548\,440\,289\,384\,360\,i\,\pi^3\left(\int_{\frac{\pi}{2}}^{\frac{7\,967\,731}{21\,420\,989}} \csc^2(t)\,dt\right)^2 -$$
$$1\,052\,086\,301\,907\,168\,i\,\pi^{5/2}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(\frac{338\,711\,007\,234\,609}{311\,703\,279\,199\,793}\right)^s$$
$$\Gamma\left(\frac{1}{2} - s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2} + s\right)ds - 74\,271\,252\,095\,744$$
$$\left(\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(\frac{338\,711\,007\,234\,609}{311\,703\,279\,199\,793}\right)^s\Gamma\left(\frac{1}{2} - s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2} + s\right)ds\right)^2\Bigg)\Big/$$
$$\left(4\,064\,532\,086\,815\,308\,\pi^2\right) \text{ for } 0 < \gamma < \frac{1}{2}$$

$$\left(\frac{1}{3}\left(\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2\right)11+\frac{1}{3}\,i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\pi=$$
$$\Bigg(-8\,129\,064\,173\,630\,616\,\pi^3+3\,725\,821\,079\,580\,699\,\pi^5+$$
$$54\,193\,761\,157\,537\,440\,i\,\pi\left(\int_0^{\infty}\frac{-1+t^{1-15\,935\,462/(21\,420\,989\pi)}}{-1+t^2}\,dt\right)^2-$$
$$1\,052\,086\,301\,907\,168\,i\,\pi^{5/2}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(\frac{338\,711\,007\,234\,609}{311\,703\,279\,199\,793}\right)^s$$
$$\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)ds-74\,271\,252\,095\,744$$
$$\left(\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\left(\frac{338\,711\,007\,234\,609}{311\,703\,279\,199\,793}\right)^s\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)ds\right)^2\Bigg)\Big/$$
$$\left(4\,064\,532\,086\,815\,308\,\pi^2\right)\ \text{for}\ 0<\gamma<\frac{1}{2}$$

And again:

1/47(((11/3 π cos^(-1)(-5196896/18404103)^2 + 10/3 i π cot^2(7967731/21420989))-2Pi)-2*0.9568666373)

Input interpretation

$$\frac{1}{47}\left(\left(\left(\frac{11}{3}\,\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{10}{3}\,i\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\pi\right)+2\times(-0.9568666373)\right)$$

$\cos^{-1}(x)$ is the inverse cosine function

$\cot(x)$ is the cotangent function

i is the imaginary unit

Result

0.670835025965… +
1.46398732018… i

(result in radians)

Alternate complex forms

$1.61037\,(\cos(1.14112)+i\sin(1.14112))$

$$1.61037\, e^{1.14112\, i}$$

Polar coordinates

$r = 1.61037$ (radius), $\theta = 1.14112$ (angle)

1.61037 result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternative representations

$$\frac{1}{47}\left(\left(\left(\frac{11}{3}\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{1}{3}i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\pi\right)-2\times 0.956867\right)=\frac{1}{47}\left(-1.91373-2\pi+\frac{11}{3}\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{10}{3}i\,\pi\left(-i\coth\left(-\frac{7\,967\,731\,i}{21\,420\,989}\right)\right)^2\right)$$

$$\frac{1}{47}\left(\left(\left(\frac{11}{3}\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{1}{3}i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\pi\right)-2\times 0.956867\right)=\frac{1}{47}\left(-1.91373-2\pi+\frac{10}{3}i\,\pi\left(-i\coth\left(-\frac{7\,967\,731\,i}{21\,420\,989}\right)\right)^2+\frac{11}{3}\pi\,\mathrm{cd}^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\,\middle|\,0\right)^2\right)$$

$$\frac{1}{47}\left(\left(\left(\frac{11}{3}\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{1}{3}i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\pi\right)-2\times 0.956867\right)=\frac{1}{47}\left(-1.91373-2\pi+\frac{11}{3}\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{10}{3}i\,\pi\left(i+\frac{2\,i}{-1+e^{(15\,935\,462\,i)/21\,420\,989}}\right)^2\right)$$

$\coth(x)$ is the hyperbolic cotangent function

$\mathrm{cd}^{-1}(x\,|\,m)$ is the inverse of the Jacobi elliptic function cd

Series representations

$$\frac{1}{47}\left(\left(\left(\frac{11}{3}\,\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{1}{3}\,i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\,\pi\right)-2\times 0.956867\right)=0.0195035$$

$$\left(-2.08771-2.18182\,\pi+\pi^3\exp^2\left(\pi\,\mathcal{A}\left[\frac{\arg\left(\frac{5\,196\,896}{18\,404\,103}+x\right)}{2\,\pi}\right]\right)+1.05929\times 10^{29}\right.$$

$$i\,\pi\left(\sum_{k=-\infty}^{\infty}\frac{1}{63\,484\,737\,288\,361-458\,858\,769\,738\,121\,k^2\,\pi^2}\right)^2-$$

$$2\,\pi^2\exp^2\left(\pi\,\mathcal{A}\left[\frac{\arg\left(\frac{5\,196\,896}{18\,404\,103}+x\right)}{2\,\pi}\right]\right)\sqrt{\pi}$$

$$\sum_{k=0}^{\infty}\frac{\left(-\frac{10\,393\,792}{18\,404\,103}-2\,x\right)^k x^{1-k}\,{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};x^2\right)}{k!}+$$

$$\pi\exp^2\left(\pi\,\mathcal{A}\left[\frac{\arg\left(\frac{5\,196\,896}{18\,404\,103}+x\right)}{2\,\pi}\right]\right)\sqrt{\pi}^2$$

$$\left.\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{10\,393\,792}{18\,404\,103}-2\,x\right)^k x^{1-k}\,{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};x^2\right)}{k!}\right)^2\right)$$

for $(x\in\mathbb{R}$ and $x>1)$

$$\frac{1}{47}\left(\left(\left(\frac{11}{3}\,\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{1}{3}\,i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\,\pi\right)-2\times 0.956867\right)=$$

$$0.0195035\left(-2.08771-2.18182\,\pi+\pi^3\exp^2\left(\pi\,\mathcal{A}\left[\frac{\arg\left(\frac{5\,196\,896}{18\,404\,103}+\text{x\$MFID}\right)}{2\,\pi}\right]\right)-2\,\pi^2\exp^2\left(\pi\,\mathcal{A}\left[\frac{\arg\left(\frac{5\,196\,896}{18\,404\,103}+\text{x\$MFID}\right)}{2\,\pi}\right]\right)\sqrt{\pi}\sum_{k=0}^{\infty}\frac{1}{k!}\left(-\frac{10\,393\,792}{18\,404\,103}-2\,\text{x\$MFID}\right)^k\text{x\$MFID}^{1-k}\,{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};\text{x\$MFID}^2\right)+\pi\exp^2\left(\pi\,\mathcal{A}\left[\frac{\arg\left(\frac{5\,196\,896}{18\,404\,103}+\text{x\$MFID}\right)}{2\,\pi}\right]\right)\sqrt{\pi}^2\left(\sum_{k=0}^{\infty}\frac{1}{k!}\left(-\frac{10\,393\,792}{18\,404\,103}-2\,\text{x\$MFID}\right)^k\text{x\$MFID}^{1-k}\,{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};\text{x\$MFID}^2\right)\right)^2+3.63636\,i\,\pi\,\mathcal{A}^2\left(\sum_{k=-\infty}^{\infty}e^{(15\,935\,462\,k\,\mathcal{A})/21\,420\,989}\,\text{sgn}(k)\right)^2\right)$$

for ($\text{x\$MFID}\in\mathbb{R}$ and $\text{x\$MFID}>1$)

$$\frac{1}{47}\left(\left(\left(\frac{11}{3}\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{1}{3}i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\pi\right)-2\times 0.956867\right)=0.0195035\left(-2.08771-2.18182\,\pi+3.63636\,i\,\pi\,\mathcal{A}^2+\pi^3\exp^2\left(\pi\,\mathcal{A}\left\lfloor\frac{\arg\left(\frac{5\,196\,896}{18\,404\,103}+x\right)}{2\,\pi}\right\rfloor\right)+14.5455\,i\,\pi\,\mathcal{A}^2\sum_{k=1}^{\infty}q^{2k}+14.5455\,i\,\pi\,\mathcal{A}^2\left(\sum_{k=1}^{\infty}q^{2k}\right)^2-2\,\pi^2\exp^2\left(\pi\,\mathcal{A}\left\lfloor\frac{\arg\left(\frac{5\,196\,896}{18\,404\,103}+x\right)}{2\,\pi}\right\rfloor\right)\sqrt{\pi}\sum_{k=0}^{\infty}\frac{\left(-\frac{10\,393\,792}{18\,404\,103}-2\,x\right)^k x^{1-k}\,{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};x^2\right)}{k!}+\pi\exp^2\left(\pi\,\mathcal{A}\left\lfloor\frac{\arg\left(\frac{5\,196\,896}{18\,404\,103}+x\right)}{2\,\pi}\right\rfloor\right)\sqrt{\pi}^2\left(\sum_{k=0}^{\infty}\frac{\left(-\frac{10\,393\,792}{18\,404\,103}-2\,x\right)^k x^{1-k}\,{}_3\tilde{F}_2\left(\frac{1}{2},\frac{1}{2},1;1-\frac{k}{2},\frac{3-k}{2};x^2\right)}{k!}\right)^2\right)$$

for $\left(x\in\mathbb{R}\text{ and }x>1\text{ and }q=e^{(7\,967\,731\,i)/21\,420\,989}\right)$

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

$n!$ is the factorial function

${}_p\tilde{F}_q(a_1,\ldots,a_p;b_1,\ldots,b_q;z)$ is the regularized generalized hypergeometric function

$\mathbb{R}$ is the set of real numbers

$\operatorname{sgn}(x)$ is the sign of x

Integral representations

$$\frac{1}{47}\left(\left(\left(\frac{11}{3}\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{1}{3}i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\pi\right)-2\times 0.956867\right)=0.070922\left(-0.57412-0.6\,\pi+i\,\pi\left(\int_{\frac{\pi}{2}}^{\frac{7\,967\,731}{21\,420\,989}}\csc^2(t)\,dt\right)^2+1.1\,\pi\left(\int_{-\frac{5\,196\,896}{18\,404\,103}}^{1}\frac{1}{\sqrt{1-t^2}}\,dt\right)^2\right)$$

$$\frac{1}{47}\left(\left(\left(\frac{11}{3}\,\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{1}{3}\,i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\,\pi\right)-2\times 0.956867\right)=\frac{1}{\pi}0.0780142\left(-0.521927\,\pi-0.545455\,\pi^2+3.63636\,i\left(\int_0^{\infty}\frac{-1+t^{1-15\,935\,462/(21\,420\,989\pi)}}{-1+t^2}\,dt\right)^2+\pi^2\left(\int_{-\frac{5\,196\,896}{18\,404\,103}}^{1}\frac{1}{\sqrt{1-t^2}}\,dt\right)^2\right)$$

$$\frac{1}{47}\left(\left(\left(\frac{11}{3}\,\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{1}{3}\,i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\,\pi\right)-2\times 0.956867\right)=\frac{1}{\pi\,\mathcal{A}^2\,\sqrt{\pi}^2}\,0.0195035\left(0.0199342\left(\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma}\left(\frac{338\,711\,007\,234\,609}{311\,703\,279\,199\,793}\right)^s\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)ds\right)^2+0.282377\,\pi^2\,\mathcal{A}\,\sqrt{\pi}\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma}\left(\frac{338\,711\,007\,234\,609}{311\,703\,279\,199\,793}\right)^s\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)ds-2.08771\,\pi\,\mathcal{A}^2\,\sqrt{\pi}^2-2.18182\,\pi^2\,\mathcal{A}^2\,\sqrt{\pi}^2+\pi^4\,\mathcal{A}^2\,\sqrt{\pi}^2+3.63636\,i\,\pi^2\,\mathcal{A}^2\left(\int_{\frac{\pi}{2}}^{\frac{7\,967\,731}{21\,420\,989}}\csc^2(t)\,dt\right)^2\sqrt{\pi}^2\right)\text{ for }0<\gamma<\frac{1}{2}$$

$$\frac{1}{47}\left(\left(\left(\frac{11}{3}\,\pi\cos^{-1}\left(-\frac{5\,196\,896}{18\,404\,103}\right)^2+\frac{1}{3}\,i\,10\,\pi\cot^2\left(\frac{7\,967\,731}{21\,420\,989}\right)\right)-2\,\pi\right)-2\times 0.956867\right)=\frac{1}{\pi\,\mathcal{A}^2\,\sqrt{\pi}^2}\,0.0195035\left(0.0199342\left(\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma}\left(\frac{338\,711\,007\,234\,609}{311\,703\,279\,199\,793}\right)^s\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)ds\right)^2+0.282377\,\pi^2\,\mathcal{A}\,\sqrt{\pi}\int_{-\mathcal{A}\,\infty+\gamma}^{\mathcal{A}\,\infty+\gamma}\left(\frac{338\,711\,007\,234\,609}{311\,703\,279\,199\,793}\right)^s\Gamma\left(\frac{1}{2}-s\right)^2\Gamma(s)\,\Gamma\left(\frac{1}{2}+s\right)ds-2.08771\,\pi\,\mathcal{A}^2\,\sqrt{\pi}^2-2.18182\,\pi^2\,\mathcal{A}^2\,\sqrt{\pi}^2+\pi^4\,\mathcal{A}^2\,\sqrt{\pi}^2+14.5455\,i\,\mathcal{A}^2\left(\int_0^{\infty}\frac{-1+t^{1-15\,935\,462/(21\,420\,989\pi)}}{-1+t^2}\,dt\right)^2\sqrt{\pi}^2\right)\text{ for }0<\gamma<\frac{1}{2}$$

$\csc(x)$ is the cosecant function

$\Gamma(x)$ is the gamma function

Now, we have that:

Non già per sostenere le opinioni dei dotti riguardo l'influenza degli astri sui fenomeni sismici, ma per dimostrare qual carattere generale abbiano alcuni fenomeni apparentemente locali, espongo alcuni studj da me fatti su recenti terremoti.

È noto che nel 1876 la città di Corleone fu scossa da frequenti terremoti; questi furono registrati esattamente con uno zelo degno d'ogni encomio dal sig. F. P. Crescimanno, capo dell' ufficio telegrafico ed appassionatissimo osservatore dei fenomeni naturali, e comunicati al Bullettino del Vulcanismo Italiano redatto dal cav. prof. M. S. De Rossi.

I miei studj s'estendono alle scosse avvenute dal 1.° Giugno al 30 Novembre, le quali si trovano in ordine cronologico nel fascicolo Novembre-Dicembre 1876 del Bullettino nominato.

In quel periodo avvennero 409 scosse, numero straordinario rispetto ad un semestre; coordinate le medesime alle ore solari, in modo che ad ogni ora spettino quelle avvertite fra 30 minuti prima e 29 dopo la medesima, compilai il seguente quadro:

1	ant.	= 37	9	ant.	9	5 pom.	12
2	»	39	10	»	8	6 »	9
3	»	36	11	»	18	7 »	9
4	»	30	Mezzodì		20	8 »	19
5	»	26	1	pom.	8	9 »	16
6	»	4	2	»	10	10 »	26
7	»	3	3	»	13	11 »	12
8	»	12	4	»	15	Mezzanotte	18

Costruendo con questi dati una curva corretta, mediante il sistema applicato alle maree nei quadri A, B e C, ma coll' aggruppamento di soli tre dati consecutivi, anzichè di sei, ottengo:

Ore	Antimeridiane Scosse	ε	Pomeridiane Scosse	ε	Somma	Differenza ant.	pom.
1	31	+ 6	13	— 5	44	+ 18	—
2	39	0	11	— 1	50	+ 28	—
3	38	— 2	12	+ 1	50	+ 26	—
4	30	0	14	+ 1	44	+ 16	—
5	21	+ 5	12	0	33	+ 9	—
6	9	— 5	10	— 1	19	— 1	+
7	5	— 2	11	— 2	16	— 6	+
8	7	+ 5	16	+ 3	23	— 9	+
9	9	0	19	— 3	28	— 10	+
10	12	— 4	19	+ 7	31	— 7	+
11	16	+ 2	17	— 5	33	— 1	+
12	16	+ 4	22	— 4	38	— 6	+

Calabria, Sicilia e Malta. (*Da lett* Cresoimanno, Conti e *Bull. met.*) — 1876. *Giugno*, 1, Corleone, 4,00, 7,15, 8,00 ant. 0,51, 4,10 5,55 e 8,25 p.; Prizzi 4,10 p. - 2, Corleone, 5,30 e 9,00 ant. - 3, Corleone, 1,30, 4,30, 11,30 a., 3,30 p. - 4, Corleone, 10,45 a.; Tagliavia, 8 a. circa - 5, Corleone, 3,35, 10,35 a. e 6,35 p. - 6, Corleone, 3,00, 4,55, e 10,30 ant. - 7, Corleone, 2,15 a., 2,45, 5,00, 5,30, 10,45 p. - 8, Corleone, 1,15 e 11,30 p. - 9, Corleone, 2,30, 3,45 e 8,30 a.; Portella di mare, verso 8,00 a. - 10, Corleone, 0,30 e 3,15 a. - 11, Corleone, Palermo, Marineo, Ogliastro, Balestriere, Ficuzza, Tagliavia, San Giuseppe, San Cipizzello, Roccamena, Bisacquino, Campofiorito, Prizzi, Palazzo-Adriano, Mezzojuso, Chiusa-Sclafani, 2,10 e 2,20 a.; Corleone, 2,35, 3,00, 9,45 a. 8,30 e 10,30 p.; Castelbuono, 2,00 a. – 12. Corleone, 0,30, 7,00 e 11,00 a., 4,00 p. - 13, Corleone, 0,45, 2,45, 8,00 e 11,00 a., 9,45 p. - 14, Corleone, 2,50, 4,50, 11,00 ant., 2,50, 8,00 e 10,25 p. – 15, Corleone, 0,31; Corleone e Nocille-Ridocco, 4,30 a.; Corleone, 7,15, 8,30 e 10,25 p. - 16, Cor-

leone, 2,50, 10,45 ant., 7,15 p. - 17, Corleone, 0,30, 2,10, 6.00 a.; Corleone e Busambra, 7,00 p. - 18, Corleone e Busambra, 0,30 a.; Corleone, 10,10 a. 3,30 e 9,45 p. - 19, Corleone, 2,10, 9,45 a. e 7,10 p. - 20, Corleone, 0,30, 3,20, 11,30 a., 3,10 p. 21, Corleone, 2,45, 7,45 a., 10,20 p. - 22, Corleone, 3,10 a. 5,15 p. - 23, Corleone, 3,00 a., 0,48 p. - 24, Corleone, 2,20, 2,35, 3,00 a. 2,10, 11,15 p. - 25, Corleone, 0,30, 11,00 a,, 7,45, 10,00, 10,30, 11,00 p.; Corleone e San Giuseppe Fato, 2,25 ant. - 26, Corleone, 2,00, 8,30 a. 12,00 merid., 4,15, 7,30, 9,30 p. – 27, Corleone, 0,30, 2,45, 11,54 a., 3,00 p. - 28, Corleone, 2,50, 4,30 a., 3,00, 4,00, 5,45 p. - 29, Castelbuono, Finale, Gerace, San Mauro, Pollina, Petralia, 0,30 a.; Corleone, 1,00 a. 3,00 e 7,30 p. - 30, Corleone, 1,30, 5,30, 11,45 a.; Pedagne, 5,00 p. - *Luglio*, 1, Corleone, 1,30, 3,00, 4,00 a., 7,30, 10,47, 11,20 p. - 2, Corleone, 3,00 a., 8,30 p.; Giaconia, 3,00 a. - 3, Corleone, 1,30 a. - 4, Corleone, 1,15, 6,30, 8,15, 11,30, 11,40 a., 7,30, 8,30 p. - 5, Corleone, 8,30 a. - 6, Corleone, 1,55 a., 0,30 p. - 7, Corleone, 0,30 a. - 8, Corleone, 3,00 a. 11,05 p. - 9, Corleone, 0,30, 3,00, 11,15 a., 8,35 p. - 10, Corleone, 2,00 p. - 11, Corleone, 5,15 a., 3,00 p, - 12, Corleone, 2,00 a., 12 merid., 4,15 p. - 13, Corleone, 4,15 a., 3,30 p. - 14, Corleone, 3,45, 8,00, 11,00 a., 3,00 p. - 15, Corleone, 1,00 a. - 16, Corleone, 8,37, 11,20 a. 12 pom. - 17, Corleone, 1,45 a., 12,00 merid. - 18, Corleone, 2,15 ant. - 19, Corleone, 0,15, 0,20, 0,30 a. - 20, Corleone, 0,15, 8,50 a., 7,45 p. - 21, Corleone, 0,30, 5,00, 7,55, 8,35, 10,00 a., 10,20 p. - 22, Corleone, 2 ant., 4,45 p. - 23, Corleone, 3,00, 10,30 p. - 24, Corleone, 3,00 a., 10,45 p. - 25, Corleone, 0,15, 2,10, 2,15 a. - 26, Corleone, 3,15 a., 5,15, 8,10 p - 27, Corleone, 4,15, 5,21 a., 5,15, 10,00 p. - 28, Corleone, 3,15 a. - 29, Corleone, 3,15, 11.00 a., 11,45 p. - 30, Corleone, 11,45 a. - 31, Corleone, 2,45, 11,00 a., 0,30 p. - *Agosto*, 1, Corleone, 4,00 p. - 4, Corleone, 2,00 a. - 5, Corleone, 0,15, 3,00 a. - 6, Corleone, 0,30, 1,30 a., 3,20 p. - 7, Corleone, 1,15, 3,45 a. - 8, Corleone, 3,35, 11,35 a., 0,20, 8,02 p, – 9, Corleone, 3,30 a., 0,15 p. - 11, Corleone, 0,15 p. - 13, Corleone, 5,30, 9,50 p. – 14, Corleone, 1,00, 8,15, 9,25 a., 4,30 p, - 15, Corleone, 2,30, 5,02 a. 3,30 p. – 16, Corleone, 1,25, 4,30 p. – 17, Corleone, 4,00 a. - 19, Corleone, 2,15 a., 2,17 p. - 20, Corleone, 4,15 a., 4,20 a., 11,42 p. – 21, Corleone, 0,15, 1,15 a. – 22, Corleone, 5,35 a. - 23, Corleone, 2,15 a. – 24, Corleone, 1,15, 2,17 a. - 26, Corleone, 1,15, 5,10, 11,55 a., 12,15 p. - 27, Corleone, 1,15, 3,17, 4,30 a. – 28, Corleone, 2,15 a. – 29, Corleone, 1,15, 11,15 a., 5,40 p. - 30, Corleone, 1,15 a. - 31, Corleone,

3,15, a., 2,00, 6,00 p. – *Settembre*, 1, Corleone 9,00 p. – 2, Corleone, 2,00, 3,30, 10,45 a., 2,00 p. - 3, Corleone, 2,00 a., 0,15, 1,10 p. - 4, Corleone, 2,37, 4,00 a. – 5. Corleone, 5,00, 8,00, 8,10 a., 3,50 p. 6, Corleone, 1,15, 7,55 a 9,45 p. – 7, Corleone, 2,15 a. - 9. Corleone, 4,30, 9,19, 9,45, 10,29 p. - 10, Corleone, 2,15, 4,30 a. - 11, Corleone, 0,45, 4,30 a., 1,00, 10,00 p. - 12, Corleone, 1,40, 11,05 a., 6,10 p. - 13, Messina, dopo mezzanotte; Regio, Palmi e Capo Spartivento, tropea, 0,08 a. e 1,00 p.; Corleone, 1,15 a. - 14, Corleone, 1.15 a. - 15, Corleone, 1,15 a. – 16, Corleone, 4,15 a. - 17, Corleone, 1,15, 2,43, 7,45 a. - 18, Corleone, 0,10 a., 2,15 p. - 19, Corleone, 1,45, 11,00 a., 9,30, 11,50 p. - 20, Corleone, 4,45 a. - 22, Corleone, 12 merid., 7,00, 9,25, 9,55, 10,26 p. - 23, Corleone, 8,15, 11,57 a., 9,31 p. - 24, Corleone, 1,33 p. - 25, Corleone, 8,00 p. - 26, Corleone, 1.38, 10,03 a. - 27, Corleone, 0,15, 2,16 a., 11,45 p. - 28, Corleone, 1,15, 4,30 a. - *Ottobre*, 1, Corleone, 1,30 pom. - 4, Corleone, 0,45 a., 10,00 pom. - 5, Corleone, 4,15 p. – 6, Corleone, 2,15 a. - 7, Corleone, 4,15 a. 8,45 p. – 8. Corleone, 5,15 p. – 9. Corleone, 11,00 a. - 10, Corleone, 5,00 a., 9,15. p. - 11, Corleone, 3,00 p.; Corleone, Farnuo, Bisacquino, 8,30 p. - 12, Corleone, Bisacquino, 5,15 a. – 16, Catania, 1,15 p.; Corleone, 3,15 p. - 17, Corleone, 7,35 e 9,26 p. - 18, Corleone, 9,30 a. - 19, Corleone, 5.00 a. - 20, Corleone, 12 merid. - 21, Bisacquino, 3,00 a.; Corleone, 5,15 a., 8,26 p. - 22, Corleone, 0,15 a. - 23, Corleone, 5,00 a., 8.10 p. - 24, Corleone, 1,30 a. - 25, Corleone, 2,45, 5,00 a., 8,15, 8,56 p.; Sciacca, 1,00 p. – 26, Corleone, 0,45, 5,15 a. - 27, Corleone, 3,00 a., 10,15 p. - 28, Corleone, 1,30 a., 5,05, 7,50, 10,30 p. - 29, Corleone, 1,30, 5,05, 5,10, 5,15 a., 10,56 p. - 30, Corleone, 10,20 a. - 31, Corleone, 10,15 a., 5,15 p. – *Novembre*, 1, Corleone, 2,00 a., 2,30 e 6,30 p. - 2, Corleone, 0,15 a., 3,30 e 10,45 p. - 3, Cosenza, 2,40 a., Corleone, 9,10 p. - 4, Corleone, 9,30 p. - 5, Corleone, 1,00 a. - 6, Corleone, 3,00 a. - 10, Corleone, 8,30 p. - 12, Corleone, 7,30 p. - 13, Corleone, 3,15, 4,05 a , 8,45 p. - 14, Corleone, 1,15 a., 9,07 p. – 15, Corleone, 3,45, 4,15 a., 1,51, 5,30, 6,05 p. - 16, Corleone, 7,45, 11,45 p. - 17, Corleone, 0,30 e 4,15 a., - 18, Corleone, 3,30 a., 6,45 p. - 19, Corleone, 4,15 a., 3,30 e 7,40 p. - 20, Corleone, 4,15 a., 9,30 p. - 21, Corleone, 2,00, 4,15 a., 10,15 p. - 22, Corleone, 9,30 p. - 23, Corleone, 6,50 p. - 25, Corleone, 4,15 a., 4,45, 10,15 p. - 26, Corleone, 4,15 a., 4,15 p. - 27, Corleone, 4,15 a., 8,45 p. - 28, Corleone, 4,15 a. - 29, Corleone, 4,15 a., 9,38 p. - 30, Corleone, 1,35 p.

La non dubbia correlazione che il Prof. De Rossi avvertì fra i terremoti di Corleone e quelli di Monte Baldo dell'anno decorso, mi mosse a dirigere una speciale attenzione anche ai secondi.

Rovistando fra gli annuari scientifici, rinvenni le date precise dei più forti terremoti avvertiti nel 1866 alle falde del Monte Baldo, cioè: 13 Giugno, 11 Agosto e 7-8 Novembre, che corrispondono ai novilunii; nel 1870 si ridestò colà l'attività sismica, ma ne ignoro le date; nel 1876 la prima forte scossa s'incontrò al 23 Aprile, cioè alla vigilia del novilunio; col perigeo (ch'ebbe luogo al 26) continuarono le scosse preparate dal novilunio fino al 29; di poi la frequenza andò diminuendo fino al 4 Maggio e sembrava già aver lasciato in pace quelle popolazioni; senonchè la prossima coincidenza del novilunio col perigeo e con una forte declinazione boreale (nella qual posizione, come già dissi, uno dei due passaggi al meridiano è un'energica occasione al terremoto) mi forniva indizio tale di risveglio, probabilmente su maggior estensione di terreno, che mi disposi pur qui ad un'attenta sorveglianza, per non lasciarmi sfuggire le fasi più importanti del fenomeno, quando questo fosse accaduto. Accennai questa probabilità al Prof. Don Timoteo Bertelli di Firenze in una mia lettera del 1.° Maggio ed al Prof. Goiran di Verona con lettera del 12 stesso.

Il giorno critico passò per altro tranquillo a Trieste; non così a Monte Baldo, ove le scosse ripresero al 22 e continuarono il 23, per ripetersi al 29; contemporaneamente a Corleone l'attività, che dal 10 sembrava pressochè spenta, si ridestò con una scossa al 20, una al 21, ben quattro al 24 e con grande energia al 25. Al 22 Maggio, vigilia del novilunio, avvenne pure il fortissimo terremoto di Spoleto ed all'epoca del novilunio in argomento non vi fu, si può dire, regione dell'Apennino, in cui non si manifestasse l'attività sismica con maggiore o minore forza, come si può rilevare dal bullettino.

A Monte Baldo durante Giugno vi fu tregua; in Luglio le scosse ripresero l'indomani del plenilunio e continuarono poscia senza interruzione; nei mesi susseguenti si notarono scosse al 7 Agosto, al 5 Settembre, al 9 Ottobre ed al 4 Novembre, cioè quasi sempre uno o due giorni dopo il plenilunio.

È rimarchevole il fatto che nei giorni 22 e 23 Maggio, mentre il resto d'Italia si scuoteva, a Corleone vi fu tregua e poscia un subito risveglio, ed è altrettanto significante la tregua verificatasi nei *novilunii* successivi a Monte Baldo di fronte all'energia manifestatasi contemporaneamente a Corleone, ove le forze endogene si trasportarono per effetti geologico-meccanici, cui non è mio compito eruire.

We have the following seismic maximums:

Corleone (Sicilia)

20-21-24-25 Maggio 1876 – 7-11 Giugno 1876 – 21 Giugno 1876 – 4 Luglio 1876 – 21-22 Luglio 1876 – 6 Agosto 1876 – 19-20 Agosto 1876 – 2-5 Settembre 1876 – 13 e 17-19 Settembre 1876 – 4 Ottobre 1876 – 16-17 Ottobre 1876- 1 Novembre 1876 – 15-16 Novembre 1876

Monte Baldo (Veneto-Trentino Alto Adige)

23 Aprile 1876; 22-23-29 Maggio 1876; 7 Agosto 1876; 5 Settembre 1876; 9 Ottobre 1876; 4 Novembre 1876

June 11, 1876 + 54 years 34 days 2 hours 6 minutes

Input interpretation

Sunday, June 11, 1876 + 54 years 34 days 2 hours 6 minutes

Result

2:06 am CET | Tuesday, July 15, 1930

1930-07-23	Irpinia	Mw = 6.67

June 11, 1876 - 72 years 45 days 10 hours 48 minutes

Input interpretation

Sunday, June 11, 1876 – 72 years 45 days 10 hours 48 minutes

Result

1:12 pm LMT | Thursday, April 26, 1804

1804-05-05	13:45	Canale di Sicilia	
1804-05-22	19:15	Gran Sasso	Mw = 5.42

And:

June 11, 1876 - 90 years 56 days 19 hours 30 minutes

Input interpretation

Sunday, June 11, 1876 – 90 years 56 days 19 hours 30 minutes

Result

4:30 am LMT | Saturday, April 15, 1786

1786-04-07		Pianura lombarda	Mw = 5.22
1786-04-11	09	Ljubljana	

April 29, 1876 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Saturday, April 29, 1876 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Friday, July 6, 1984

1984-07-01	07:47	Monti della Meta	Mw = 4.63
1984-07-01	16:46	Campi Flegrei	Mw = 4.10

April 29, 1876 - 144 years 90 days 21 hours 36 minutes

Input interpretation

Saturday, April 29, 1876 – 144 years 90 days 21 hours 36 minutes

Result

2:24 am LMT | Tuesday, January 29, 1732

1732-02-04	18:20	Parma	Mw = 4.65

April 29, 1876 - 126 years 79 days 12 hours 54 minutes

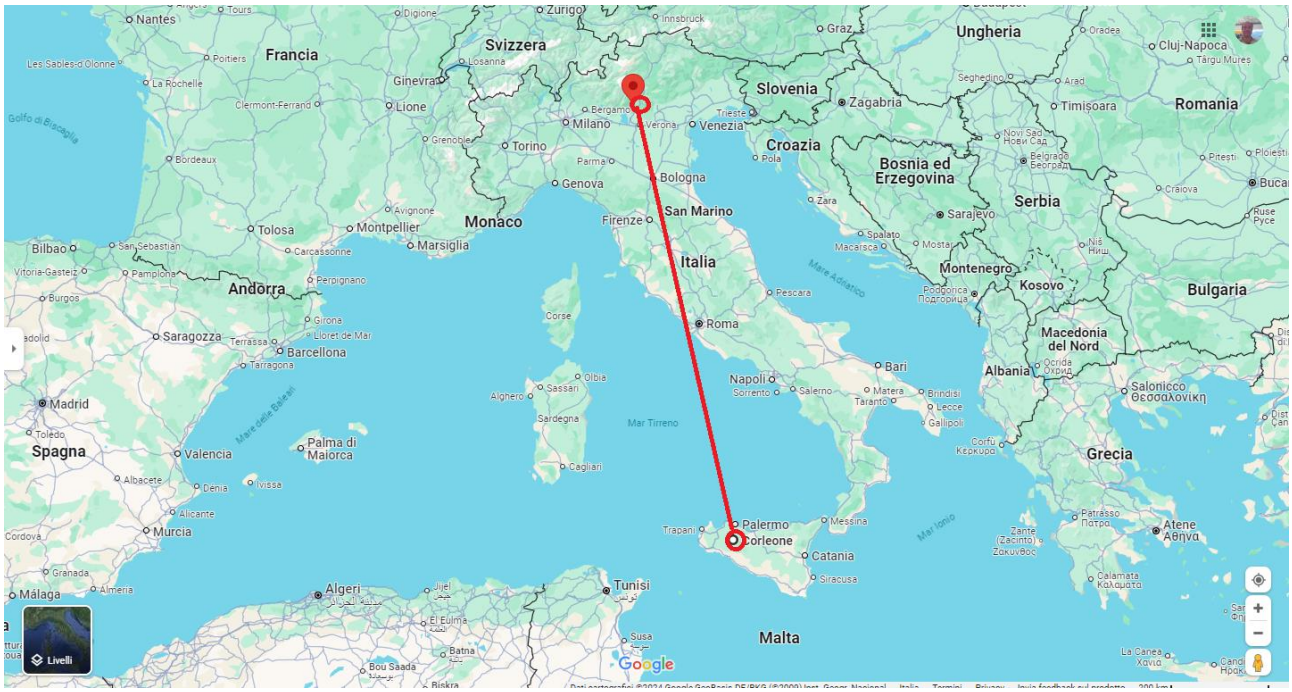
Input interpretation

Saturday, April 29, 1876 – 126 years 79 days 12 hours 54 minutes

Result

11:06 am LMT | Sunday, February 8, 1750

1750-02-01	Aquilano	Mw = 4.86	
1750-02-08	Colli Albani	Mw = 4.50	



To the North the radiant of Monte Baldo (Prov. Verona), to the South the radiant of Corleone (Prov. Palermo, Sicily)

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

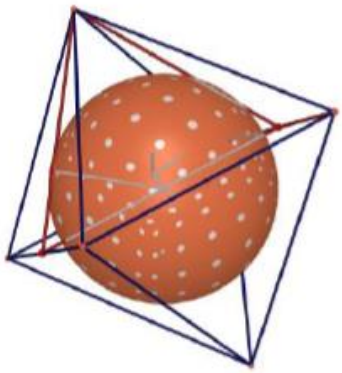


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor \arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2=\frac{2}{3}\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2=\frac{2}{3}\left(\int_0^{1}\frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.14193957152658430892433073219616263267751338681165904468254173 93

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}$ $5^{-1/(3\pi)}$ (e/((2 π C_{MRB})/3+ϕ^2))$^{1/3}$+1)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}\approx 3.1419$$ (real, principal root)

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}\approx -3.1419$$ (real root)

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not $(z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0)$)

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$
$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8].

Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\leq 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

4096 = 64^2 , (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$). The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{-1+256\sqrt{2}^{\,8}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^{\,8}\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{-1+256\sqrt{2}^{\,8}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^{\,8}\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

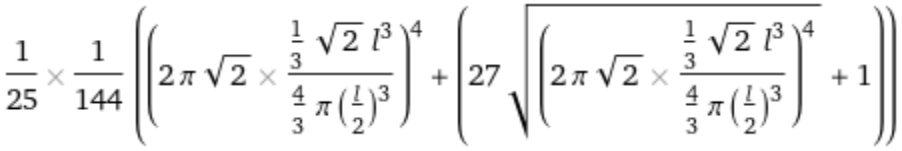
$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input



Exact result

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

1.61805 (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+\right.$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+\right.$$
$$27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^{\,8}\right)}{2\pi}\right\rfloor\right)\sqrt{x}$$
$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^{\,8}\right)^k}{k!}\right) \text{ for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$

$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^{\,8}-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^{\,8}-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x\rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi e^{0} \approx 3.1416$ (real, principal root)

$\pi e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}-\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1 \sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003 \quad \text{(real, principal root)}$$

$$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003 \quad \text{(real root)}$$

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\pi \left\lfloor \frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k \left(\frac{8}{\pi^2}-x\right)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)3}}{3\times3}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)3}}{3\times3}}=$$

$$\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\ a^3\right)\left(\sqrt{2}\ d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\frac{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}{3\times3}}}} =$$

$$\sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.1415926535884871624221932509858715278931025189245576170078100613
…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano's Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\left(\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2 \times \frac{2 \cdot \sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi \cdot 0.9991104684}(C \times \mathrm{R} \times 2.33 \cdot 10^{-13})}} \cong 1.61803398 \ldots = \frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5 \sqrt[4]{5^3}}-1}}-\varphi+1} = 1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}} \approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.6180359123482642354401744088347098542545273508401733563064818107
…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$0.809018\,x^2\,y\,z$ + constant

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\,dx\,dy\,dz = 12.9443\,L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\,dz\,dy\,dx = 6.77761\,R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$ is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

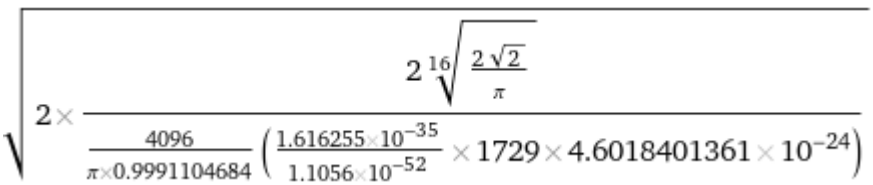
From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...



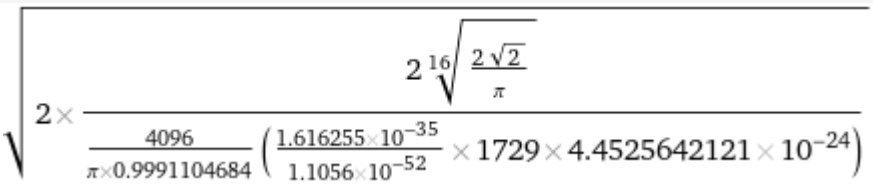
1.6180329973075324915067570166297467464225772608929671407919395903
…

1.6180329973075… result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation



Result

1.644932352102092130483898983704151168876621841655166877914166033 8
…

1.64493235210209213…≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

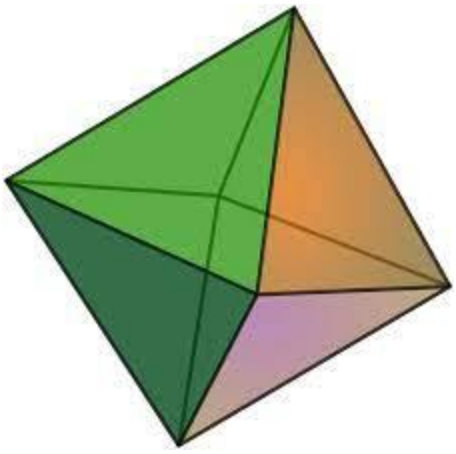
Result

3.14159225731469939399500392316057964697311717816444239557900247 97

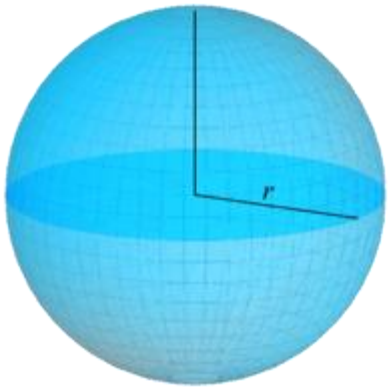
…

3.14159225731469…≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find *a*, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

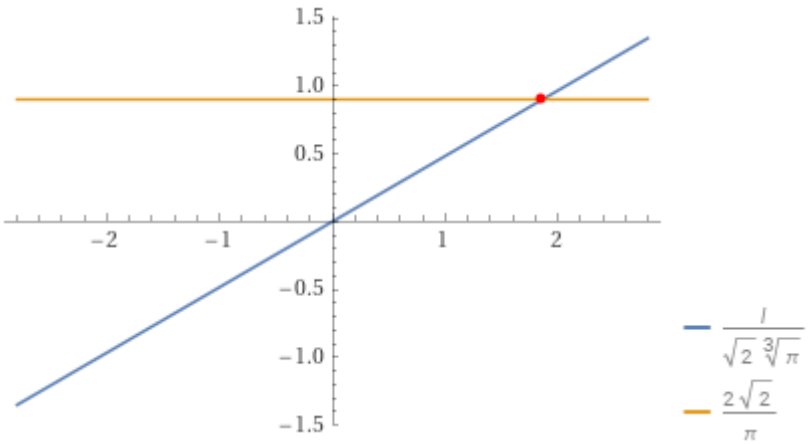
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256x^8 + 95\,744x^7 - 3\,248\,750\,080x^6 - 914\,210\,725\,504x^5 + 15\,498\,355\,554\,921\,184x^4 + 2\,911\,478\,392\,539\,914\,656x^3 - 32\,941\,144\,911\,224\,677\,091\,680x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi =$$
$$\left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi =$$
$$\left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

.

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not}\ (z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

1.64381856858…. $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256x^8+95\,744x^7-3\,248\,750\,080x^6-914\,210\,725\,504x^5+15\,498\,355\,554\,921\,184x^4+2\,911\,478\,392\,539\,914\,656x^3-32\,941\,144\,911\,224\,677\,091\,680x^2-3\,092\,528\,914\,069\,760\,354\,714\,456x+26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x=1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right)+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

.

$$\sqrt[15]{-\frac{187}{4}+\frac{29\sqrt{5}}{4}+54\sqrt{1093}-\frac{27}{8}\sqrt{10-2\sqrt{5}}-\frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^{0}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

.

$$e^{(2i\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

.

$$e^{(4i\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.0999 + 1.2216\,i$$

.

$$e^{(2i\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8i\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\text{^}(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\text{^}(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\text{^}(1/15)\right)$$
for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\,e^{\gamma_E\,\phi} \;=\; -\,\frac{\beta_E^{(p)}\,h^2}{\gamma_E}\,e^{-2\,(8-p)\,C+2\,\beta_E^{(p)}\,\phi}$$

$$16\,k'\,e^{-2C} \;=\; \frac{h^2\left(p\;+\;1\;-\;\frac{2\,\beta_E^{(p)}}{\gamma_E}\right)e^{-2\,(8-p)\,C+2\,\beta_E^{(p)}\,\phi}}{(7\;-\;p)}$$

$$(A')^2 \;=\; k\,e^{-2A} \;+\; \frac{h^2}{16(p+1)}\left(7 - p + \frac{2\,\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\,e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning p, C, β_E and ϕ correspond to the exponents of e (i.e. of exp). Thence we obtain for p = 5 and $\beta_E = 1/2$:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while $-6C+\phi$ is equal to $-\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$\exp\left(-\pi\sqrt{18}\right)$

Exact result:

$e^{-3\sqrt{2}\,\pi}$

Decimal approximation:

$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$

$1.6272016\ldots * 10^{-6}$

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625}\ e^{-6C+\phi} = \frac{1}{0.000244140625}\ e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}} \times \frac{1}{0.000244140625}$$

= 0.00666501785…

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

−5.010882647757...

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor\frac{\arg(0.006665017846190000 - x)}{2\,\pi}\right\rfloor + \log(x) - \sum_{k=1}^{\infty}\frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor\frac{\arg(0.006665017846190000 - z_0)}{2\,\pi}\right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor\frac{\arg(0.006665017846190000 - z_0)}{2\,\pi}\right\rfloor \log(z_0) - \sum_{k=1}^{\infty}\frac{(-1)^k\,(0.006665017846190000 - z_0)^k\,z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000}\frac{1}{t}\,dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \cfrac{}{1 + \ldots}}}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M, V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M, V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154317775011120075}{2\,(226802245 + 18480874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18480874\,M}{226802245 + 18480874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226802245 + 18480874\,b)^2\,M}{154317775011120075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36961748\,(226802245 + 18480874\,b)\,M^2}{154317775011120075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b+1)^2\,M^2\right\} = 0 \text{ at } (b,M) = (-16,0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\} = 0$$

for $b = -\frac{226802245}{18480874}$

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\} = 0$$

for $M = 0$

From:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

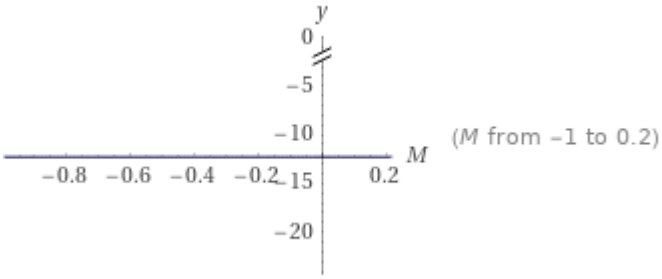
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2 + 6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

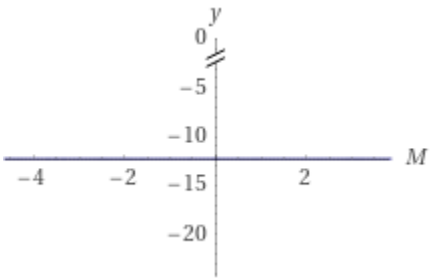
Result:

$$\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4} - 0.054323\,M^2\right)}{M^2}$$

Plots:



(M from −1 to 0.2)



(M from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty \left(\frac{225.913 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4} \right)}{M^2} - -12.2723 \right) dM = 0$$

From b that is equal to

$$\frac{225.913 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4} \right)}{M^2}$$

From:

$$V = \frac{1}{3} (0.0814845\, b + 1)^2 M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

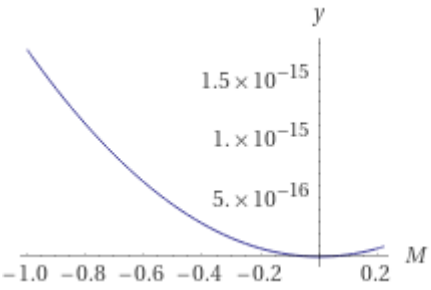
Input interpretation:

$$\frac{1}{3} \left(0.0814845 \times \frac{225.913 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4} \right)}{M^2} + 1 \right)^2 M^2$$

Result:

0

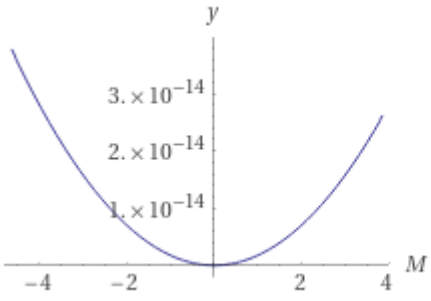
Plots: **(possible mathematical connection with an open string)**



(*M* from −1 to 0.2)

M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O\left(M^{62194}\right)$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{1}{3}M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2\left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^-16

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times10^{-17}$

7.021621519159*10^{-17}

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

$1.57986484181*10^{-14}$

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 2^2 + 6.58545 \times 10^{-10}\sqrt{2^4}\right)}{2^2} + 1\right)^2 \times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\,\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}\,l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}\,l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_{0}}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\ \hat{}\ (1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\ \sqrt[4]{3}\ e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182...

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

5.729475 * 10^{-35} Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

1.820306 * 10^{61} V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

5.975498*10^{-8} V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

1.042940*10^{27} V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

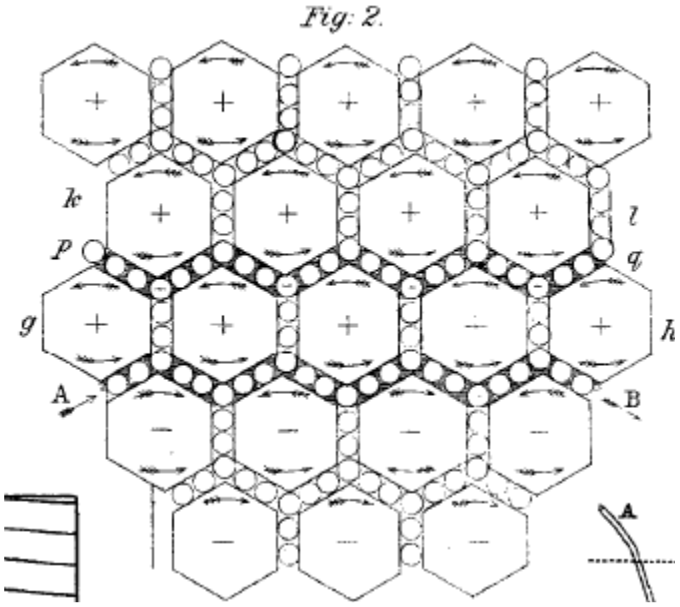
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

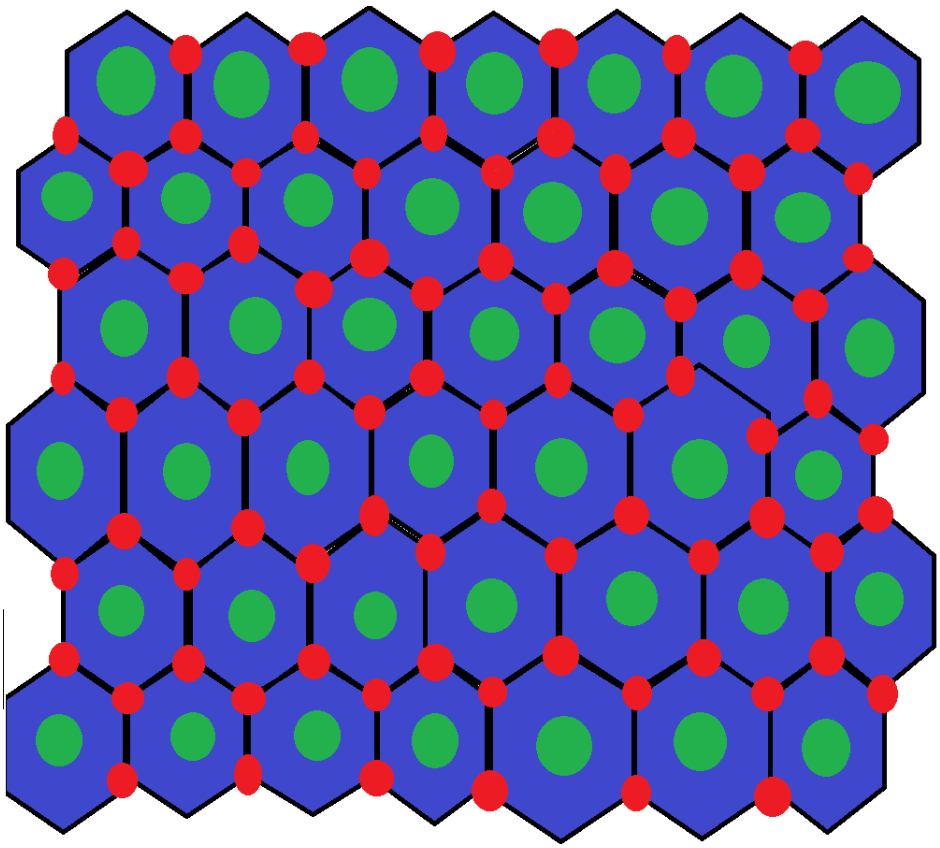
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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On the study of some historical earthquakes: Towards a mathematical-statistical model for the prediction of endogenous phenomena

SEISMOLOGY - By *Perry Byerly* - New York, 1942 - PRENTICE-HALL INC.

A Number Theoretic Analysis of the Enthalpy, Enthalpy Energy Density, Thermodynamic Volume, and the Equation of State of a Modified White Hole, and the Implications to the Quantum Vacuum Spacetime, Matter Creation and the Planck Frequency. - *Nardelli, M., Kubeka, A.S. and Amani, A.* (2024) - Journal of Modern Physics , 15, 1-50. - https://doi.org/10.4236/jmp.2024.151001

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

An Update on Brane Supersymmetry Breaking - *Jihad Mourad and Augusto Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On the study of various earthquakes, geophysical phenomena and related equations. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory VI

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper, (part VI) we analyze various earthquakes, geophysical phenomena and related equations. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory

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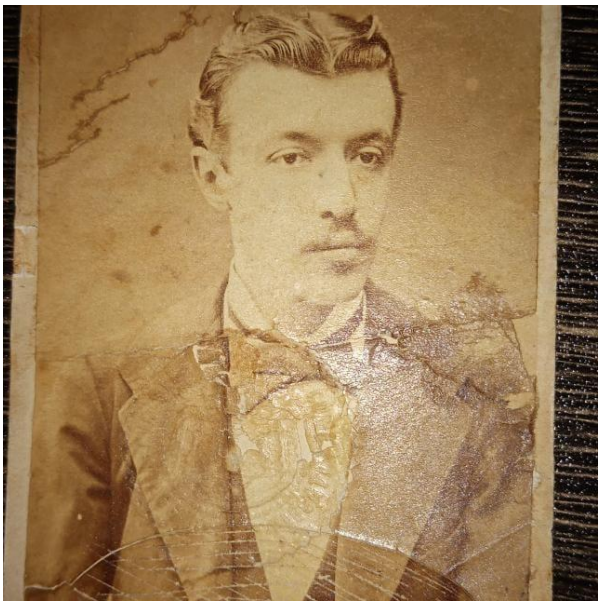
Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

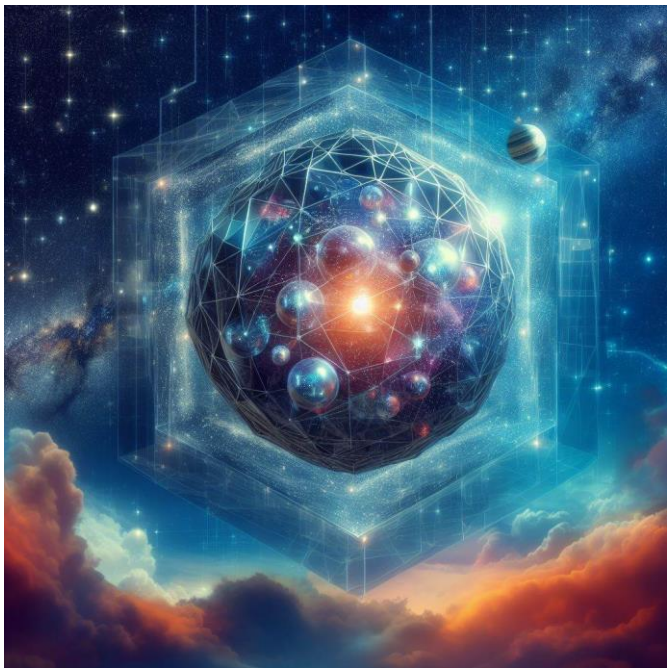
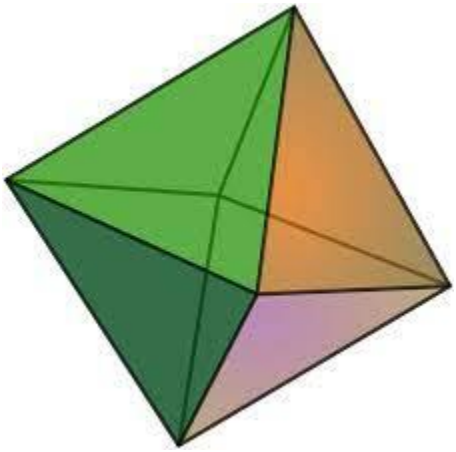
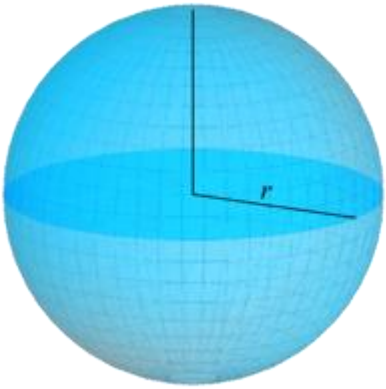


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\pi x^3}{3} - \frac{\sqrt{2}\, l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3} l}{\sqrt{2}\, \sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\, l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\, \sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3} l}{\sqrt{2}\, \sqrt[3]{\pi}}$$

Integer solution

$l = 0\,, \quad x = 0$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\, \pi x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\, \pi x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

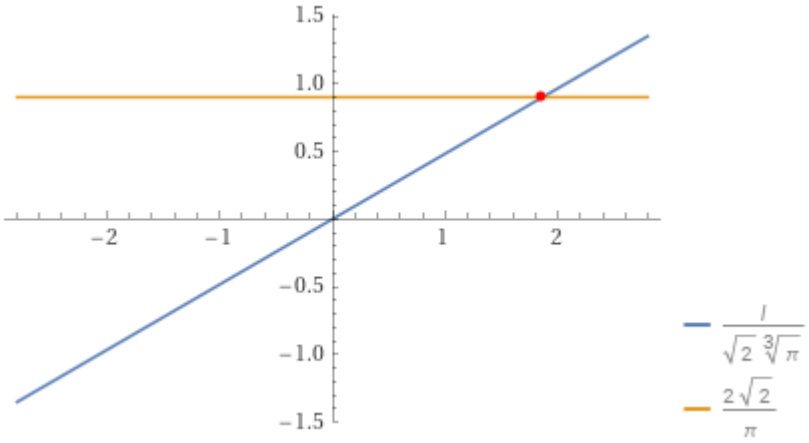
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

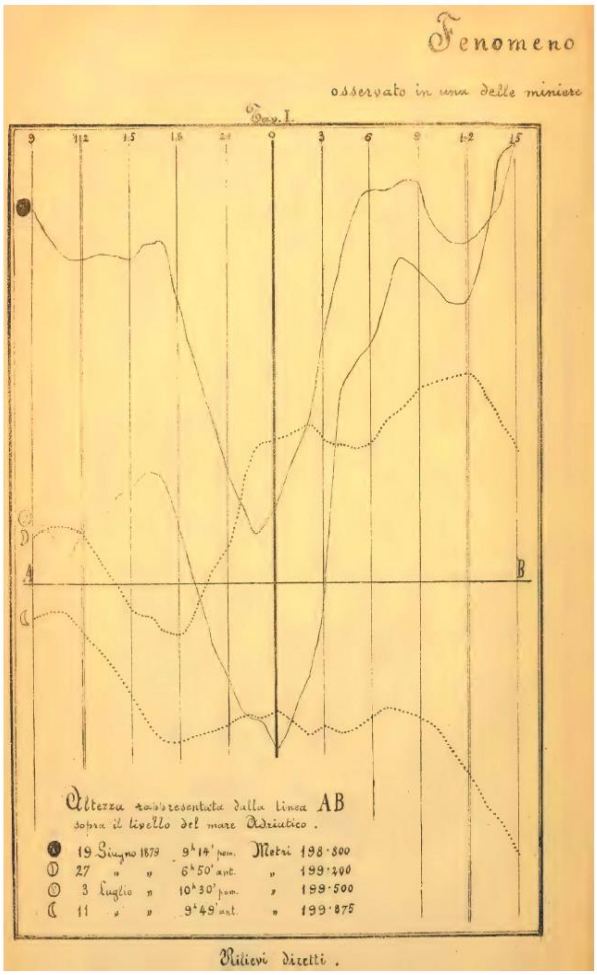
Plot

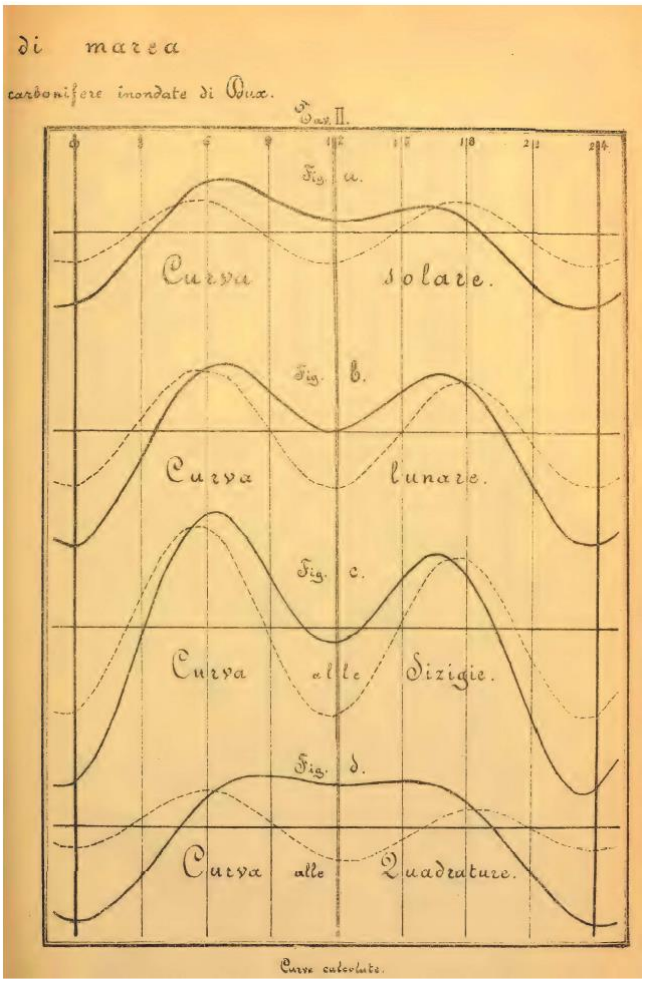


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

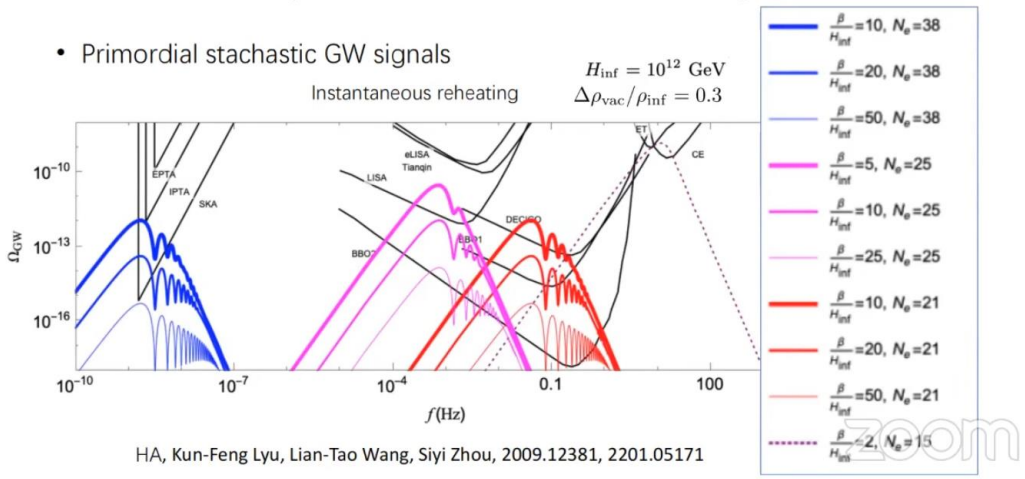

di marea
carboniferе inondate di Dux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating



HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

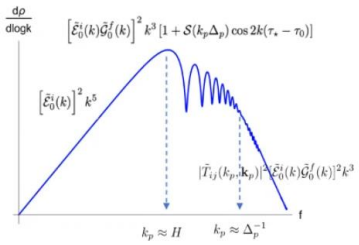
Comparison between primary GW and secondary GW

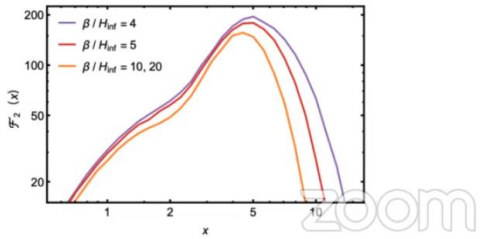
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





From: "Dell'attrazione luni-solare in relazione coi fenomeni mareo-sismici: studi dimostrativi" di Giulio Grablovitz – Trieste 1877

Non già per sostenere le opinioni dei dotti riguardo l'influenza degli astri sui fenomeni sismici, ma per dimostrare qual carattere generale abbiano alcuni fenomeni apparentemente locali, espongo alcuni studj da me fatti su recenti terremoti.

È noto che nel 1876 la città di Corleone fu scossa da frequenti terremoti; questi furono registrati esattamente con uno zelo degno d'ogni encomio dal sig. F. P. Crescimanno, capo dell' ufficio telegrafico ed appassionatissimo osservatore dei fenomeni naturali, e comunicati al Bullettino del Vulcanismo Italiano redatto dal cav. prof. M. S. De Rossi.

I miei studj s'estendono alle scosse avvenute dal 1.° Giugno al 30 Novembre, le quali si trovano in ordine cronologico nel fascicolo Novembre-Dicembre 1876 del Bullettino nominato.

In quel periodo avvennero 409 scosse, numero straordinario rispetto ad un semestre; coordinate le medesime alle ore solari, in modo che ad ogni ora spettino quelle avvertite fra 30 minuti prima e 29 dopo la medesima, compilai il seguente quadro:

1 ant.	= 37	9 ant.	9	5 pom.	12
2 »	39	10 »	8	6 »	9
3 »	36	11 »	18	7 »	9
4 »	30	Mezzodì	20	8 »	19
5 »	26	1 pom.	8	9 »	16
6 »	4	2 »	10	10 »	26
7 »	3	3 »	13	11 »	12
8 »	12	4 »	15	Mezzanotte	18

Costruendo con questi dati una curva corretta, mediante il sistema applicato alle maree nei quadri A, B e C, ma coll' aggruppamento di soli tre dati consecutivi, anzichè di sei, ottengo:

Ore	Antimeridiane Scosse	ε	Pomeridiane Scosse	ε	Somma	Differenza ant.	pom.
1	31	+ 6	13	— 5	44	+ 18	—
2	39	0	11	— 1	50	+ 28	—
3	38	— 2	12	+ 1	50	+ 26	—
4	30	0	14	+ 1	44	+ 16	—
5	21	+ 5	12	0	33	+ 9	—
6	9	— 5	10	— 1	19	— 1	+
7	5	— 2	11	— 2	16	— 6	+
8	7	+ 5	16	+ 3	23	— 9	+
9	9	0	19	— 3	28	— 10	+
10	12	— 4	19	+ 7	31	— 7	+
11	16	+ 2	17	— 5	33	— 1	+
12	16	+ 4	22	— 4	38	— 6	+

in cui i quadrati degli errori sommano a 296, mentre negando ogni influenza solare e rappresentando con una retta il numero orario delle scosse, la somma dei quadrati degli errori salirebbe a 2455.

Le somme rappresentano il risultato che si otterrebbe coordinando le scosse alle 12 ore, senza aver riguardo se queste sieno antimeridiane o pomeridiane; le differenze rappresentano l' ineguaglianza fra le ore antimeridiane e pomeridiane d'ugual valore.

Nelle somme si riesce ad escludere perciò almeno gran parte degli effetti termici, tenendo conto degli effetti dell' attrazione; nelle differenze si raggiunge lo scopo inverso.

Le somme presenterebbero un massimo d'intensità alle 2 $^1/_2$ ed un minimo alle 6 $^3/_4$, mentre le differenze offrirebbero un massimo principale verso le 2 $^1/_2$ ant. e conseguentemente un minimo uguale verso le 2 $^1/_2$ pom.; inoltre un massimo secondario alle 9 pom. con un minimo rispettivo alle 9 ant.

La curva composta presenta il massimo assoluto alle 2^h 26′ ant. ed il minimo assoluto fra le 7 e le 8 ant. con altre flessioni di poca importanza; il massimo concorda esattamente con quello del prof. Schmidt, senonchè nei terremoti di Corleone l'attività sismica oscilla entro limiti assai più larghi, stando il minimo (5) al massimo (39) nel rapporto di 1 a 7,8.

I terremoti stessi distribuiti secondo le ore lunari, danno i risultati che figurano nel seguente quadro e che sono calcolati nel modo identico a quello tenuto per riguardo all' influenza solare:

	Dati		Curva corretta	ε
Fra 0 e 1 ora	20		18	+ 2
» 1 » 2 ore	15		18	− 3
» 2 » 3 »	16		17	− 1
» 3 » 4 »	19		17	+ 2
» 4 » 5 »	18		18	0
» 5 » 6 »	16		19	− 3
» 6 » 7 »	20		20	0
» 7 » 8 »	24		21	+ 3
» 8 » 9 »	17		20	− 3
» 9 » 10 »	20		19	+ 1
» 10 » 11 »	17		18	− 1
» 11 » 12 »	20		20	− 3
» 12 » 13 »	19		18	+ 1
» 13 » 14 »	17		16	+ 1
» 14 » 15 »	8		13	− 5
» 15 » 16 »	20		16	+ 4
» 16 » 17 »	16		15	+ 1
» 17 » 18 »	15		15	0
» 18 » 19 »	8		11	− 3
» 19 » 20 »	15		12	+ 3
» 20 » 21 »	11		13	− 2
» 21 » 22 »	14		14	0
» 22 » 23 »	18		15	+ 3
» 23 » 24 »	9		15	− 6
» 24 » 24^h 48′	17 × 1 $^1/_4$ = 21		18	+ 3
		Somma ε^2 rispetto alla curva		167
		» » » » retta		406
		Massimo 7^h 30′ =		21
		Minimo 18^h 30′ =		11

Per ottenere la curva semidiurna, converrebbe sommare i valori appartenenti alle prime 12 ore *lunari* a quelli delle 12 seguenti; conviene fare a tale scopo un'interpolazione di valori semi-orari, ma per evitare valori frazionari ed inutili divisioni, basta sommare i dati di due ore consecutive ed alternare con questi i dati orari raddoppiati, il che torna perfettamente lo stesso; in tale modo si ricaverà il seguente quadro:

				Σ	Δ
0h	36		36	72	0
	36	13h	34	70	+ 2 —
1h	36		32	68	+ 4 —
	36	14h	29	65	+ 7 —
2h	35		26	61	+ 9 —
	34	15h	29	63	+ 5 —
3h	34		32	66	+ 2 —
	34	16h	31	65	+ 3 —
4h	35		30	65	+ 5 —
	36	17h	30	66	+ 6 —
5h	37		30	67	+ 7 —
	38	18h	26	64	+ 12 —
6h	39		22	61	+ 17 —
	40	19h	23	63	+ 17 —
7h	41		24	65	+ 17 —
	42	20h	25	67	+ 17 —
8h	41		26	67	+ 15 —
	40	21h	27	67	+ 13 —
9h	39		28	67	+ 11 —
	38	22h	29	67	+ 9 —
10h	37		30	67	+ 7 —
	36	23h	30	66	+ 6 —
11h	38		30	68	+ 8 —
	40	24h	33	73	+ 7 —
12h	38		36	74	+ 2 —

La curva semidiurna presenta il massimo assoluto (74, che diviso per 4 dà 18,5 come quantità delle scosse in un'ora) esattamente all'ora del passaggio al meridiano, ed un minimo (61 : 4 = 15,2) all'ora in cui la luna è all'orizzonte; il che concorda pienamente con la legge Perrey; un altro minimo, forse casuale, s'incontra alle 2h e 14h.

La curva semidiurna viene peraltro nascosta nella curva generale, dalla molto più sensibile curva diurna, che contiene *tutti* valori positivi dal passaggio al meridiano superiore fino all'inferiore e *tutti* negativi nell'altra metà della giornata lunare; la frequenza dei terremoti prevale decisamente poco dopo il tramonto della luna ed è minima poco dopo il levare della stessa.

L'egregio Crescimanno osservò benissimo nella sua dettagliata relazione che i terremoti di Corleone hanno mostrato alquanto più di forza nei primi quarti di luna; infatti se si prende a considerare che la massima frequenza rispetto al sole ha luogo 14h 26' dopo il passaggio al meridiano superiore, e rispetto alla luna

7h 30' dopo il momento stesso, i massimi delle due curve andranno a coincidere, allorchè la luna passerà al meridiano 7h 30' prima delle 2h 26' antim., cioè alle 6h 56' pom., il che corrisponde a 24 ore incirca dopo il primo quarto ed in questa fase le scosse più forti avverranno intorno alle 2 1/2 ant., il che è confermato dall'osservazione.

In conseguenza di ciò la prevalenza dei terremoti notata dal Dottor Schmidt fra l'ottavo ed il nono giorno della luna trovasi pienamente verificata nei fenomeni di Corleone.

Il Crescimanno in un'altra lettera dice: « È un fatto però accertatissimo che le scosse incalzano, ed hanno incalzato nella luna nnova e nel primo quarto ». La prevalenza al novilunio si spiega da sè con l'azione contemporanea dei due astri.

È evidente che la sovrapposizione delle due curve della luna e del sole dovrà dare ampiezze differenti, secondo le fasi, come avviene per le maree; per es. in un giorno in cui la luna passa al meridiano alle 2 pom. la curva risultante dalla somma delle due curve, sarà la seguente:

Ore	Sole	Luna	Totale		Digressione dalla media 34
antim. 1	31	19	50		+ 16
» 2	39	19	58	massimo	+ 24
» 3	38	17	55		+ 21
» 4	30	14	44		+ 10
» 5	21	14	35		+ 1
» 6	9	16	25		— 9
» 7	5	15	20	minimo	— 14
» 8	7	13	20		— 14
» 9	9	12	21		— 13
» 10	12	13	25		— 9
» 11	16	14	30		— 4
» 12	16	15	31		— 3
pom. 1	13	15	28		— 6
» 2	11	18	29		— 5
» 3	12	18	30		— 4
» 4	14	18	32		— 2
» 5	12	17	29		— 5
» 6	10	18	28		— 6
» 7	11	19	30		— 4
» 8	16	20	36		+ 2
» 9	19	21	40		+ 6
» 10	19	20	39		+ 5
» 11	17	19	36		+ 2
» 12	22	18	40		+ 6

Media = 34

Differenza fra massimo e minimo = 38

Σ delle digressioni, senza riguardo al segno = 191

Calcolate col metodo stesso le altre fasi, ne ottenni:

Passaggio della luna al meridiano	Digressione totale	Massimo	Minimo	Differenza
0	171	19	— 17	36
1	183	22	— 16	38
2	191	24	— 14	38
3	197	24	— 13	37
4	209	23	— 15	38
5	211	24	— 15	39
6	207	25	— 13	38
7	205	26	— 11	37
8	205	25	— 10	35
9	203	24	— 11	35
10	193	23	— 11	34
11	183	22	— 12	34
12	179	23	— 11	34
13	169	23	— 10	33
14	163	23	— 10	33
15	161	22	— 11	33
16	163	20	— 12	32
17	145	19	— 11	30
18	131	18	— 11	29
19	125	17	— 11	28
20	131	18	— 14	32
21	141	20	— 14	34
22	145	21	— 15	36
23	157	20	— 16	36

In questo quadro il massimo dei massimi diurni coincide con l'epoca in cui la luna passa al meridiano alle 7 pom. ed il minimo dei massimi diurni cade nelle epoche in cui il passaggio avviene alle 7 ant.; la digressione totale segue press'a poco lo stesso andamento; il minimo di frequenza coinciderebbe dunque con l'ultimo quarto ed in queste epoche appunto vi furono giorni di tregua, come si può osservare dal bullettino; ciò confermerebbe del pari i risultati del Dott. Schmidt.

Come risulta dai calcoli esposti, la frequenza oraria dei terremoti varia entro i limiti di 5 e 39 per l'influenza solare e fra 11 e 21 per l'influenza lunare, mentre la frequenza media oraria è = 17. Da questa benchè semplice e rozza valutazione dell'influenza luni-solare sui terremoti di Corleone, si può arguire che questi ebbero quale causa determinante principale l'attrazione dei due astri e l'azione termica del sole.

In questo rapporto il Prof. De Rossi intravide con somma accortezza nei fenomeni di Corleone una causa generale appoggiandosi al confronto dei medesimi coi fenomeni sismici avvertiti in altre regioni del sistema italiano, cioè nel Monte Baldo, nell'Umbria e nel Gargano, nonchè coi propri strumenti microsismografici in Roma. Merita speciale attenzione l'aver lui detto, che *il periodo sismico di Corleone, per quanto locale e ristretto intorno al suo centro, sarebbe apparso chiaramente un semplice membro in azione del grande apparato italiano.*

L'aver potuto dimostrare con l'eloquenza delle cifre, che quei fenomeni sono da ascriversi quasi esclusivamente all'azione luni-solare, è tal fatto che basta a proclamarli d'indole tellurica generale.

IV.

La non dubbia correlazione che il Prof. De Rossi avvertì fra i terremoti di Corleone e quelli di Monte Baldo dell'anno decorso, mi mosse a dirigere una speciale attenzione anche ai secondi.

Rovistando fra gli annuari scientifici, rinvenni le date precise dei più forti terremoti avvertiti nel 1866 alle falde del Monte Baldo, cioè: 13 Giugno, 11 Agosto e 7-8 Novembre, che corrispondono ai novilunii; nel 1870 si ridestò colà l'attività sismica, ma ne ignoro le date; nel 1876 la prima forte scossa s'incontrò al 23 Aprile, cioè alla vigilia del novilunio; col perigeo (ch'ebbe luogo al 26) continuarono le scosse preparate dal novilunio fino al 29; di poi la frequenza andò diminuendo fino al 4 Maggio e sembrava già aver lasciato in pace quelle popolazioni; senonchè la prossima coincidenza del novilunio col perigeo e con una forte declinazione boreale (nella qual posizione, come già dissi, uno dei due passaggi al meridiano è un'energica occasione al terremoto) mi forniva indizio tale di risveglio, probabilmente su maggior estensione di terreno, che mi disposi pur qui ad un'attenta sorveglianza, per non lasciarmi sfuggire le fasi più importanti del fenomeno, quando questo fosse accaduto. Accennai questa probabilità al Prof. Don Timoteo Bertelli di Firenze in una mia lettera del 1.° Maggio ed al Prof. Goiran di Verona con lettera del 12 stesso.

Il giorno critico passò per altro tranquillo a Trieste; non così a Monte Baldo, ove le scosse ripresero al 22 e continuarono il 23, per ripetersi al 29; contemporaneamente a Corleone l'attività, che dal 10 sembrava pressochè spenta, si ridestò con una scossa al 20, una al 21, ben quattro al 24 e con grande energia al 25. Al 22 Maggio, vigilia del novilunio, avvenne pure il fortissimo terremoto di Spoleto ed all'epoca del novilunio in argomento non vi fu, si può dire, regione dell'Apennino, in cui non si manifestasse l'attività sismica con maggiore o minore forza, come si può rilevare dal bullettino.

A Monte Baldo durante Giugno vi fu tregua; in Luglio le scosse ripresero l'indomani del plenilunio e continuarono poscia senza interruzione; nei mesi susseguenti si notarono scosse al 7 Agosto, al 5 Settembre, al 9 Ottobre ed al 4 Novembre, cioè quasi sempre uno o due giorni dopo il plenilunio.

È rimarchevole il fatto che nei giorni 22 e 23 Maggio, mentre il resto d'Italia si scuoteva, a Corleone vi fu tregua e poscia un subito risveglio, ed è altrettanto significante la tregua verificatasi nei *novilunii* successivi a Monte Baldo di fronte all'energia manifestatasi contemporaneamente a Corleone, ove le forze endogene si trasportarono per effetti geologico-meccanici, cui non è mio compito eruire.

Nel 1870, a quanto mi sovviene, il periodo sismico di Monte Baldo pose termine a quello del Monte Nevoso (Alpi Giulie). Questo era cominciato al 28 Febbraio con una forte scossa alle 12.20 pom.; l'indomani le scosse si ripeterono e così pure nel giorno del novilunio, 2 Marzo, e nel successivo; dopo una tregua di quindici giorni s'avvertì una scossa al plenilunio; si ebbero poi altre scosse, di cui non potei sapere le date; quelle che giunsero a mia cognizione, e furono le più forti, avvennero il 28 Aprile (vigilia del novilunio), il 10 Maggio, il

15 Maggio (plenilunio), il 2 Giugno (presso al novilunio) e parecchie fra il 13 ed il 19 Giugno (epoca del plenilunio). Poi l'attività si spense quivi e si destò a Monte Baldo. Il Monte Nevoso fu soggetto di frequente a terremoti; in epoca relativamente recente se n'ebbe un lungo periodo dal Novembre 1750 al Maggio del 1753; e nel 1838 per tre mesi le popolazioni dimorarono attendate. In quella zona locale è compresa la città di Fiume; ed anche nei piccoli terremoti, che quivi avvengono di quando in quando, ho rimarcato una decisa prevalenza alle sizigie.

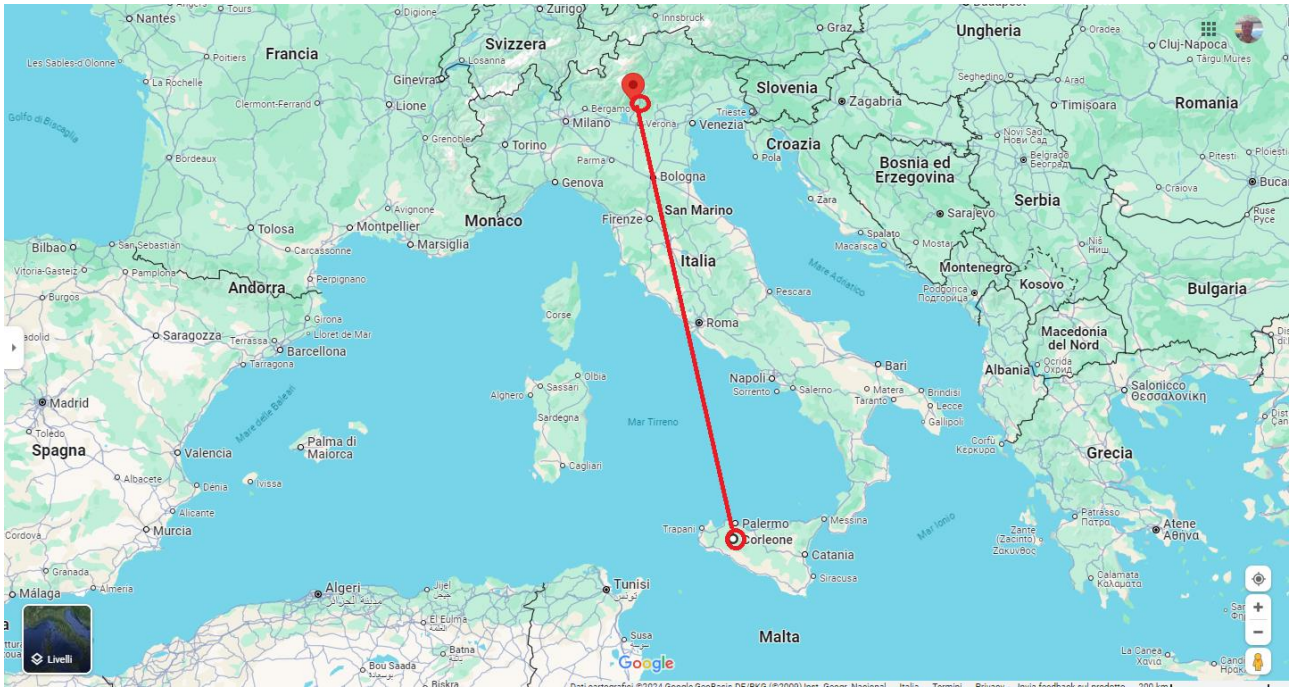
Da ciò si vede che alcuni periodi sismici, quantunque circoscritti entro strettissimi confini, possono essere l'effetto di una grande causa tellurica.

Ho preso in considerazione speciale il periodo di Corleone, perchè questo è uno dei pochi, di cui le fasi siano state studiate attentamente e di cui s'abbia un numero abbastanza grande di scosse, per trarne conseguenze positive.

V'ebbe un altro periodo sismico di recente memoria e bene studiato, quello di Belluno; la relazione esistente fra esso e le posizioni lunari non ha alcun bisogno delle mie dimostrazioni, perchè l'illustre Falb la provò dal momento che presagì in base alle sue teorie il ritorno del fenomeno ancora durante lo svolgimento del periodo stesso.

Forse tutti i fenomeni sismici che avvengono in Italia hanno per causa, se non diretta, almeno determinante, l'azione degli astri, ma mentre da un lato la mancanza di sufficienti osservazioni non permette studj molto estesi, dall'altro canto il traslocamento, che spesso avviene, dei centri sismici distoglie l'attenzione degl'indagatori in modo da non permettere a questi di intravedere nei fenomeni isolati gli effetti d'una grande causa comune.

È desiderabile che l'invito fatto reiteratamente dal Prof. Cav. De Rossi, per ottenere il maggior numero possibile di relazioni sui fenomeni sismici, venga ascoltato da quanti hanno a cuore i progressi della scienza e che niuno s'astenga, dal comunicare le osservazioni anche grossolane di tali fenomeni, la cui memoria senza di ciò potrebbe andar perduta a danno della scienza.



The two seismic radiating areas of Northern Italy (Monte Baldo, Verona province) and Southern Italy (Corleone - Metropolitan city of Palermo - Sicily)

From the following data

44
50
50
44
33
19
16
23
28
31
33
38

we obtain:

(44+50+50+44+33+19+16+23+28+31+33+38)

Input

44 + 50 + 50 + 44 + 33 + 19 + 16 + 23 + 28 + 31 + 33 + 38

Result

409

409 which is equal to the number of seismic events that occurred in Corleone from 01.06.1876 to 30.11.1876

The maximum seismic events occurred at the following times:

1 ant. = 37
2 » 39
3 » 36

i.e.

(37+39+36)

Input

37 + 39 + 36

Result

112

112

We obtain, dividing the two previous expressions:

(44+50+50+44+33+19+16+23+28+31+33+38) / (37+39+36)

Input

$$\frac{44 + 50 + 50 + 44 + 33 + 19 + 16 + 23 + 28 + 31 + 33 + 38}{37 + 39 + 36}$$

Exact result

$$\frac{409}{112}$$

Decimal approximation

3.651785714285714285714285

Decimal approximation

1.64937899727003587415636146915680850662218435097427434797786720 06
…

1.64937899727…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$\frac{1}{409}\left(409 + 2\sqrt[3]{14}\ 409^{2/3}\right)$$

$$\frac{2}{409}\left(\sqrt[3]{14}\ 409^{2/3}\right) + 1$$

Minimal polynomial

$$409\,x^3 - 1227\,x^2 + 1227\,x - 521$$

From the previous expression

44 + 50 + 50 + 44 + 33 + 19 + 16 + 23 + 28 + 31 + 33 + 38

after some calculations, we obtain:

2*5(44+50+50+44+33+19+16+23+28+31+33+38)+2*3

Input

$$2\times 5\,(44 + 50 + 50 + 44 + 33 + 19 + 16 + 23 + 28 + 31 + 33 + 38) + 2\times 3$$

Result

4096

4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

27*sqrt((2*5(44+50+50+44+33+19+16+23+28+31+33+38)+2*3))+1

Input

$$27\sqrt{2\times5\,(44+50+50+44+33+19+16+23+28+31+33+38)+2\times3}+1$$

Result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$.

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(27*sqrt((2*5(44+50+50+44+33+19+16+23+28+31+33+38)+2*3))+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{27\sqrt{2\times 5\,(44+50+50+44+33+19+16+23+28+31+33+38)+2\times 3}+1}+C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Exact result

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\sqrt[15]{1729}$$

Decimal approximation

1.644938024130260257941733191946366957420242441725816380271305678 2

…

1.64493802413…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate form

$$C_{\text{MRB}}^{\,-1/(4\pi)}\left(\sqrt[15]{1729}\;\sqrt[4\pi]{C_{\text{MRB}}}+C_{\text{MRB}}^{\,1+\pi}\right)$$

Curva corretta

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15
18

36+34+37+41+39+38+34+29+30+23+27+30+18

Input

36 + 34 + 37 + 41 + 39 + 38 + 34 + 29 + 30 + 23 + 27 + 30 + 18

Result

416

416

Dati

20
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35+35+34+44+37+37+36+28+31+23+25+27+17

Input

35 + 35 + 34 + 44 + 37 + 37 + 36 + 28 + 31 + 23 + 25 + 27 + 17

Result

409

409

Dividing the corrected curve by the data, we get:

(36+34+37+41+39+38+34+29+30+23+27+30+18)/(35+35+34+44+37+37+36+28+31+23+25+27+17))

Input

$$\frac{36+34+37+41+39+38+34+29+30+23+27+30+18}{35+35+34+44+37+37+36+28+31+23+25+27+17}$$

Exact result

$$\frac{416}{409}$$

Decimal approximation

1.017114914425427872860635696821515892420537897310513447432762836 1

…

1.0171149144….

From which, after some calculations, we obtain:

1+1/(((36+34+37+41+39+38+34+29+30+23+27+30+18)/(35+35+34+44+37+37+36+28+31+23+25+27+17)))^25

Input

$$1+\frac{1}{\left(\frac{36+34+37+41+39+38+34+29+30+23+27+30+18}{35+35+34+44+37+37+36+28+31+23+25+27+17}\right)^{25}}$$

Exact result

496 519 906 104 405 738 657 673 761 879 464 691 782 599 776 117 417 328 269 428 ⋱
945 625 /
300 146 487 727 936 868 333 023 305 262 224 527 875 850 989 512 440 124 870 414 ⋱
565 376

Decimal approximation

1.654258591739605867763322283914831491836210417174337887070980397 8
…

1.6542585917396…. result very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3$ = 1164.2696 i.e. 1.6557845...

We obtain also, multiplying the two previous expressions and after some calculations:

4(((36+34+37+41+39+38+34+29+30+23+27+30+18)(35+35+34+44+37+37+36+28 +31+23+25+27+17)))^1/2+76+3

Input

$$4\sqrt{((36+34+37+41+39+38+34+29+30+23+27+30+18)(35+35+34+44+37+37+36+28+31+23+25+27+17))}+76+3$$

Result

$$79+16\sqrt{10634}$$

Decimal approximation

1728.940604991585750142784442958581635724378422066228029287198943 8
…

1728.94060499158575….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Minimal polynomial

$$x^2 - 158\,x - 2716063$$

(4(((36+34+37+41+39+38+34+29+30+23+27+30+18)(35+35+34+44+37+37+36+28+31+23+25+27+17)))^1/2+76+3)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$(4\sqrt{((36+34+37+41+39+38+34+29+30+23+27+30+18)(35+35+34+44+37+37+36+28+31+23+25+27+17))}+76+3)\,\hat{}\,(1/15)+C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Exact result

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\sqrt[15]{79+16\sqrt{10634}}$$

Decimal approximation

1.64493425948848045948192825052978410023169953672969801335563893 36…

1.64493425948848…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate form

$$C_{\text{MRB}}^{\,-1/(4\pi)}\left(\sqrt[15]{79+16\sqrt{10634}}\;\sqrt[4\pi]{C_{\text{MRB}}}+C_{\text{MRB}}^{\,1+\pi}\right)$$

(1/27((4(((36+34+37+41+39+38+34+29+30+23+27+30+18)(35+35+34+44+37+37+36+28+31+23+25+27+17)))^1/2+76+3)-1))^2+1/5

Input

$$\left(\frac{1}{27}\left((4\sqrt{((36+34+37+41+39+38+34+29+30+23+27+30+18)(35+35+34+44+37+37+36+28+31+23+25+27+17))}+76+3\right)-1\right)^2+\frac{1}{5}$$

Result

$$\frac{1}{5}+\frac{1}{729}\left(78+16\sqrt{10634}\right)^2$$

Decimal approximation

4095.918428503000517177331101648201282816190718576586519298769595 6

…

4095.9184285…. ≈ 4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero.

Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternate forms

$$\frac{13\,642\,669 + 12\,480\sqrt{10\,634}}{3645}$$

$$\frac{1}{5} + \frac{4}{729}\left(39 + 8\sqrt{10\,634}\right)^2$$

Expanded form

$$\frac{13\,642\,669}{3645} + \frac{832\sqrt{10\,634}}{243}$$

Minimal polynomial

$$13\,286\,025\,x^2 - 99\,455\,057\,010\,x + 184\,466\,167\,689\,961$$

Now, we have that:

(From: "Dell'attrazione luni-solare in relazione coi fenomeni mareo-sismici – studi dimostrativi" di Giulio Grablovitz" - 1877)

Rovistando fra gli annuari scientifici, rinvenni le date precise dei più forti terremoti avvertiti nel 1866 alle falde del Monte Baldo, cioè: 13 Giugno, 11 Agosto e 7-8 Novembre, che corrispondono ai novilunii; nel 1870 si ridestò colà l'attività sismica, ma ne ignoro le date; nel 1876 la prima forte scossa s'incontrò al 23 Aprile, cioè alla vigilia del novilunio; col perigeo (ch'ebbe luogo al 26) continuarono le scosse preparate dal novilunio fino al 29; di poi la frequenza andò diminuendo

1876-04-29 - Cassone (Malcesine – prov, Verona) disastrous earthquake

(G. Mercalli “Vulcani e fenomeni vulcanici in Italia”)

24 April 1876 07:03:36 New Moon 04°25'22 367628.00 km

April 23, 1876 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Sunday, April 23, 1876 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Saturday, June 30, 1984

1984-06-24	22:02	Monti della Meta	Mw 4.57
1984-07-01	07:47	Monti della Meta	Mw 4.63
1984-07-01	16:46	Campi Flegrei	Mw 4.10

29 June 1984 03:18:27 New Moon 07°33'47 374645.63 km

June 30, 1984 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Saturday, June 30, 1984 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Thursday, July 11, 2002

2002-07-08	08:12	Irpinia	Mw 4.06

10 Jul 2002 10:26:01 New Moon 18°00'03 375909.66 km

July 11, 2002 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Thursday, July 11, 2002 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Wednesday, July 22, 2020

2020-07-15 05:40 Etna - Versante meridionale Mw 3.08

2020-07-17 02:50 Slovenia nord-occidentale Mw 4.06

Jul 20, 2020 5:32:57 PM New Moon 28°26'44 377189.89 km

1876-06-11 Corleone - disastrous earthquake (G. Mercalli “Vulcani e fenomeni vulcanici in Italia”)

June 11, 1876 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Sunday, June 11, 1876 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Saturday, August 18, 1984

1984-08-03 23:15 Garfagnana Mw = 3.3

1984-08-22 14:53 Tirreno meridionale Mw = 4.16

August 4, 1984 02:32:48 First quarter 11°53'49 374104.82 km

August 26, 1984 19:25:31 New Moon 03°42'58 359185.66 km

August 18, 1984 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Saturday, August 18, 1984 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Thursday, August 29, 2002

2002-09-06 01:21 Tirreno meridionale Mw = 5.92

August 22, 2002 22:29:15 Full Moon 29°38'49 400112.11 km

September 7, 2002 03:10:18 New Moon 14°20'20 359673.26 km

August 29, 2002 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Thursday, August 29, 2002 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Wednesday, September 9, 2020

2020-09-27	18:10	Etna - Versante nord-orientale	Mw = 3.19
2020-09-27	19:15	Etna - Versante nord-orientale	Mw = 3.19
2020-09-30	01:01	Stretto di Sicilia	Mw = 4.28

1 October 2020 21:05:16 Full Moon 09°08'15 405149.87 km

May 22 and 29, 1876 strong earthquakes in Spoleto and Monte Baldo

1876-05-22		Spoleto	Mw = 4.57
1876-05-29	10:30	Monte Baldo	Mw = 4.3
1876-05-29	10:45	Monte Baldo	Mw = 4.86

May 23, 1876 15:25:19 New Moon 02°46'36 360510.30 km

May 23, 1876 + 108 years 68 days 4 hours 12 minutes

Input

Tuesday, May 23, 1876 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Monday, July 30, 1984

1984-08-03	23:15	Garfagnana	Mw = 3.3

28 Jul 1984 11:51:14 New Moon 05°34'12 365429.44 km

July 30, 1984 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Monday, July 30, 1984 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Saturday, August 10, 2002

2002-09-06 01:21 Tirreno meridionale Mw = 5.92

7 September 2002 03:10:18 New Moon 14°20'20 359673.26 km

August 10, 2002 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Saturday, August 10, 2002 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Friday, August 21, 2020

2020-09-27 18:10 Etna - Versante nord-orientale Mw = 3.19

1 October 2020 21:05:16 Full Moon 09°08'15 405149.87 km

We have also:

June 11, 1876 - 90 years 56 days 19 hours 30 minutes

Input interpretation

Sunday, June 11, 1876 – 90 years 56 days 19 hours 30 minutes

Result

4:30 am LMT | Saturday, April 15, 1786

1786-04-11	09	Ljubljana (Slovenia)	Mw 4.63

April 13, 1786 15:04:24 Full Moon 23°48'37 406401.15 km

April 15, 1786 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Saturday, April 15, 1786 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am LMT | Thursday, April 26, 1804

1804-05-05	13:45	Canale di Sicilia?	
1804-05-22	19:15	Gran Sasso	Mw 5.42

May 9, 1804 15:57:56 New Moon 18°45'20 357165.69 km

May 24, 1804 13:48:30 Full Moon 03°06'15 405052.12 km

April 26, 1804 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Thursday, April 26, 1804 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am LMT | Tuesday, May 7, 1822

6, 8, 9 10 May 1822 – Earthquakes in various places in Sicily (Giuseppe Mercalli – "Vulcani e fenomeni vulcanici in Italia")

May 6, 1822 04:48:13 Full Moon 15°03'42 406049.21 km

From

$$N_{tide} \sim \frac{9Gr_e^5}{4}\left[\frac{m_m^2}{R_m^6\left(1+\frac{19\mu_m}{2g\rho_m r_e}\right)}+\frac{m_s^2}{R_s^6\left(1+\frac{19\mu_s}{2g\rho_s r_e}\right)}\right]\sin(2\epsilon)\approx 4.5\times 10^{16} N\cdot m.$$

$$\frac{9Gr_e^5}{4}\left[\frac{m_m^2}{R_m^6\left(1+\frac{19\mu_m}{2g\rho_m r_e}\right)}+\frac{m_s^2}{R_s^6\left(1+\frac{19\mu_s}{2g\rho_s r_e}\right)}\right]\sin(2\epsilon)$$

R_m = 384400 Km ; R_s = 149597870 Km ; m_m = 7.342×10^{22} Kg ; m_s = 1.9891×10^{30} Kg ; ρ_m = 3.3462×10^3 kg/m³ ; ρ_s = 1.408×10^3 kg/m³ ; G = 6.67430*10^-11 N m^2/Kg^2 ; r_e = 6372.507 Km

(9/4*(6.67430*10^-11*6372.507^5)*(((((7.342*10^22)^2)/(384400^6*(1+((19x)/(2*9.81*3.3462*10^3*

6372.5)))+
(((1.9891*10^30)^2)/(149597870^6*(1+((19y)/(2*9.81*1.408*10^3*6372.5)))))*sin(
4.8)))

Input interpretation

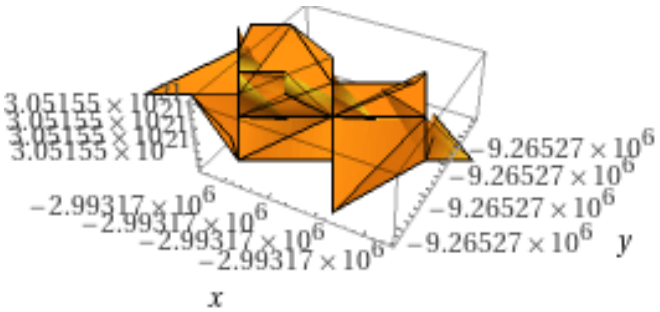
$$\frac{9}{4}\left(6.67430\times10^{-11}\times6372.507^5\right)\times$$
$$\left(7.342\times10^{22}\right)^2\Big/\left(384\,400^6\left(1+\frac{19\,x}{2\times9.81\times3.3462\times10^3\times6372.5}\right)+\right.$$
$$\left.\frac{\left(1.9891\times10^{30}\right)^2}{149\,597\,870^6\left(1+\frac{19\,y}{2\times9.81\times1.408\times10^3\times6372.5}\right)}\sin(4.8)\right)$$

Result

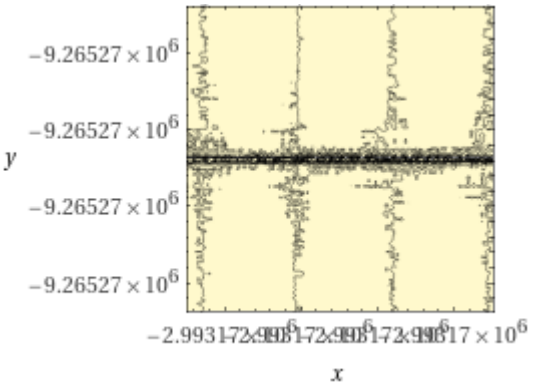
$$8.50685\times10^{54}\Big/\left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\left(4.54143\times10^{-8}\,x+\right.\right.$$
$$\left.\left.1\right)-\frac{3.51635\times10^{11}}{1.0793\times10^{-7}\,y+1}\right)$$

3D plot **(figures that can be related to the D-branes/Instantons)**

The key observation from the below plots and is that at $x = 1 \ldots \infty$, which is taken as the energy density of the universe at the Big Bang, with $y = 0$ the zero spacetime volume, the vacuum geometry brakes / or there is symmetry breaking on the vacuum quantum geometry. We see from the plots as the vacuum spacetime break/tear apart.



Contour plot



Expanded form

$$\frac{8.50685\times10^{54}\,y+7.88182\times10^{61}}{1.46519\times10^{26}\,x\,y+1.35753\times10^{33}\,x+3.22627\times10^{33}\,y+2.98922\times10^{40}}$$

Partial fraction expansion

$$\begin{aligned}&(1\,766\,847\,064\,778\,384\,329\,583\,297\,500\,742\,918\,515\,827\,483\,896\,875\,618\,958\,121\,\ddots.\\&\quad 606\,201\,292\,619\,776\,x)/((146\,518\,725\,700\,196\,890\,314\,801\,152\,x+\\&\quad 3\,226\,266\,762\,397\,899\,606\,462\,834\,631\,770\,112)\\&\quad (146\,518\,725\,700\,196\,890\,314\,801\,152\,x\,y+\\&\quad 1\,357\,534\,995\,354\,802\,981\,279\,174\,481\,674\,240\,x+\\&\quad 3\,226\,266\,762\,397\,899\,606\,462\,834\,631\,770\,112\,y+\\&\quad 29\,892\,220\,351\,867\,984\,645\,247\,761\,509\,045\,753\,610\,240))+\\&8\,506\,846\,730\,493\,854\,778\,043\,139\,068\,566\,233\,212\,157\,804\,191\,250\,644\,992/\\&\quad (146\,518\,725\,700\,196\,890\,314\,801\,152\,x+\\&\quad 3\,226\,266\,762\,397\,899\,606\,462\,834\,631\,770\,112)\end{aligned}$$

Alternate form assuming x and y are real

$$\frac{8.50685\times10^{54}}{1.46519\times10^{26}\,x-\frac{3.51635\times10^{11}}{1.0793\times10^{-7}\,y+1}+3.22627\times10^{33}}+0$$

Alternate forms

$$\frac{8.50685\times10^{54}\left(y+9.26527\times10^{6}\right)}{1.46519\times10^{26}\,x\,y+1.35753\times10^{33}\,x+3.22627\times10^{33}\,y+2.98922\times10^{40}}$$

$$\frac{2.63675\times10^{21}\left(1.0793\times10^{-7}\,y+1.\right)}{x\left(4.90157\times10^{-15}\,y+4.54143\times10^{-8}\right)+1.0793\times10^{-7}\,y+1}$$

Root

$$y\approx-9.26527\times10^{6}\,,\quad 5.48891\times10^{13}\,x+1.64292\times10^{20}\neq0$$

Properties as a function

Domain

$$\{(x,y)\in\mathbb{R}^2 : y\neq-\frac{880\,200\,288}{95}\ \text{and}$$
$$1\,593\,565\,769\,472\,469\,104\,369\,751\,982\,830\,472\,908\,523\,033\,005\,848\,486\,795\,\ddots$$
$$949\,759\,944\,500\,x\,y^2+$$
$$29\,529\,622\,089\,191\,766\,604\,997\,005\,342\,651\,648\,615\,961\,501\,186\,975\,658\,\ddots$$
$$150\,719\,493\,403\,784\,505\,600\,x\,y+$$
$$136\,799\,904\,565\,461\,866\,594\,458\,664\,956\,523\,788\,397\,074\,288\,114\,149\,\ddots$$
$$032\,385\,541\,292\,111\,711\,695\,363\,461\,120\,x+$$
$$35\,089\,496\,248\,172\,403\,911\,094\,097\,754\,822\,779\,331\,935\,502\,582\,335\,918\,\ddots$$
$$786\,909\,648\,021\,215\,807\,045\,y^2+$$
$$650\,227\,046\,387\,710\,934\,656\,786\,341\,871\,477\,131\,724\,843\,725\,692\,564\,\ddots$$
$$619\,557\,525\,954\,068\,479\,652\,024\,451\,136\,y+$$
$$35\,570\,955\,821\,642\,273\,626\,294\,225\,078\,125\,000\,000\,000\,000\,000\,000\,000\,\ddots$$
$$000\,000\,y\sin\left(\frac{24}{5}\right)\neq\frac{1}{95}$$
$$\left(-286\,165\,016\,747\,926\,262\,172\,826\,259\,634\,870\,315\,164\,810\,692\,054\,794\,\ddots\right.$$
$$188\,796\,572\,388\,669\,275\,280\,717\,030\,836\,474\,563\,584-$$
$$31\,309\,565\,558\,644\,805\,878\,838\,981\,286\,502\,447\,500\,000\,000\,000\,000\,\ddots$$
$$\left.000\,000\,000\,000\,000\,000\sin\left(\frac{24}{5}\right)\right)\}$$

Range

$$\{z\in\mathbb{R} : z\neq0\}$$

$\mathbb{R}$ is the set of real numbers

Series expansion at x=0

$$\frac{8.50685\times10^{54}\,y+7.88182\times10^{61}}{3.22627\times10^{33}\,y+2.98922\times10^{40}}+\frac{x\left(-1.24641\times10^{81}\,y^2-2.30967\times10^{88}\,y-1.06998\times10^{95}\right)}{\left(3.22627\times10^{33}\,y+2.98922\times10^{40}\right)^2}+\left(x^2\left(1.82623\times10^{107}\,y^3+5.07615\times10^{114}\,y^2+4.70318\times10^{121}\,y+1.45254\times10^{128}\right)\right)/\left(3.22627\times10^{33}\,y+2.98922\times10^{40}\right)^3+\left(x^3\left(-2.67577\times10^{133}\,y^4-9.91667\times10^{140}\,y^3-1.37821\times10^{148}\,y^2-8.51298\times10^{154}\,y-1.97188\times10^{161}\right)\right)/\left(3.22627\times10^{33}\,y+2.98922\times10^{40}\right)^4+\left(x^4\left(3.9205\times10^{159}\,y^5+1.81622\times10^{167}\,y^4+3.36556\times10^{174}\,y^3+3.11828\times10^{181}\,y^2+1.44458\times10^{188}\,y+2.67689\times10^{194}\right)\right)/\left(3.22627\times10^{33}\,y+2.98922\times10^{40}\right)^5+O\left(x^5\right)$$

(Taylor series)

Series expansion at x=∞

$$\frac{8.50685\times10^{54}\,y+7.88182\times10^{61}}{x\left(1.46519\times10^{26}\,y+1.35753\times10^{33}\right)}+\frac{-2.74454\times10^{88}\,y^2-5.08577\times10^{95}\,y-2.35605\times10^{102}}{x^2\left(1.46519\times10^{26}\,y+1.35753\times10^{33}\right)^2}+\frac{8.8546\times10^{121}\,y^3+2.46121\times10^{129}\,y^2+2.28037\times10^{136}\,y+7.04276\times10^{142}}{x^3\left(1.46519\times10^{26}\,y+1.35753\times10^{33}\right)^3}+\left(-2.85673\times10^{155}\,y^4-1.05874\times10^{163}\,y^3-1.47142\times10^{170}\,y^2-9.08873\times10^{176}\,y-2.10524\times10^{183}\right)/\left(x^4\left(1.46519\times10^{26}\,y+1.35753\times10^{33}\right)^4\right)+O\left(\left(\frac{1}{x}\right)^5\right)$$

(Laurent series)

Partial derivatives

$$\frac{\partial}{\partial x}\left(8\,506\,846\,730\,493\,854\,778\,043\,139\,068\,566\,233\,212\,157\,804\,191\,250\,644\,992\Big/\left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\left(4.54143\times10^{-8}\,x+1\right)-\frac{3.51635\times10^{11}}{1.0793\times10^{-7}\,y+1}\right)\right)=$$
$$-\Big(\big(1\,246\,412\,342\,678\,845\,841\,165\,385\,029\,920\,294\,308\,557\,112\,081\,498\,683\,088\cdot\cdot\cdot 965\,391\,586\,620\,992\,482\,535\,538\,688\left(y+9.26527\times10^{6}\right)^2\big)\Big/\big(x\,(146\,518\,725\,700\,196\,890\,314\,801\,152\,y+1\,357\,534\,995\,354\,802\,981\,279\,174\,481\,674\,240)+3\,226\,266\,762\,397\,899\,606\,462\,834\,631\,770\,112\,y+29\,892\,220\,351\,867\,984\,645\,247\,761\,509\,045\,753\,610\,240\big)^2\Big)$$

$$\frac{\partial}{\partial y}\left(8\,506\,846\,730\,493\,854\,778\,043\,139\,068\,566\,233\,212\,157\,804\,191\,250\,644\,992\Big/\left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\left(4.54143\times10^{-8}\,x+1\right)-\frac{3.51635\times10^{11}}{1.0793\times10^{-7}\,y+1}\right)\right)=$$
$$-\Big(27\,715\,223\,946\,068\,435\,897\,028\,344\,007\,344\,840\,926\,013\,982\,316\,443\,351\,697\cdot\cdot\cdot 959\,887\,092\,288\,847\,872\Big/\big(x\,(146\,518\,725\,700\,196\,890\,314\,801\,152\,y+1\,357\,534\,995\,354\,802\,981\,279\,174\,481\,674\,240)+3\,226\,266\,762\,397\,899\,606\,462\,834\,631\,770\,112\,y+29\,892\,220\,351\,867\,984\,645\,247\,761\,509\,045\,753\,610\,240\big)^2\Big)$$

Indefinite integral

$$\int\frac{8.50685\times10^{54}}{3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\left(1+4.54143\times10^{-8}\,x\right)-\frac{3.51635\times10^{11}}{1+1.0793\times10^{-7}\,y}}\,dx=\frac{\left(8.50685\times10^{54}\,y+7.88182\times10^{61}\right)\log\left(x\left(1.46519\times10^{26}\,y+1.35753\times10^{33}\right)+3.22627\times10^{33}\,y+2.98922\times10^{40}\right)}{1.46519\times10^{26}\,y+1.35753\times10^{33}}+\text{constant}$$

(assuming a complex-valued logarithm)

$\log(x)$ is the natural logarithm

Limit

$$\lim_{x\to\pm\infty} 8.50685\times10^{54} \Big/ \left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\left(1+4.54143\times10^{-8}\,x\right)-\frac{3.51635\times10^{11}}{1+1.0793\times10^{-7}\,y}\right)=0\approx0$$

$$\lim_{y\to\pm\infty} 8.50685\times10^{54} \Big/ \left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\left(1+4.54143\times10^{-8}\,x\right)-\frac{3.51635\times10^{11}}{1+1.0793\times10^{-7}\,y}\right)=\frac{9.18144\times10^{47}}{1.58138\times10^{19}\,x+3.48211\times10^{26}}$$

From the result

$$8.50685\times10^{54} \Big/ \left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\left(4.54143\times10^{-8}\,x+1\right)-\frac{3.51635\times10^{11}}{1.0793\times10^{-7}\,y+1}\right)$$

we obtain:

(8.50685×10^54)/(3226266762397899821056000000000000 (4.54143×10^-8 x + 1) - (3.51635×10^11)/(1.0793×10^-7 y + 1)) = 4.5*10^16

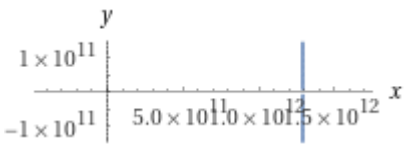
Input interpretation

$$\left(8.50685\times10^{54}\right) \Big/ \left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\left(4.54143\times10^{-8}\,x+1\right)-\frac{3.51635\times10^{11}}{1.0793\times10^{-7}\,y+1}\right)=4.5\times10^{16}$$

Result

$$8.50685\times10^{54}\Big/\left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\left(4.54143\times10^{-8}\,x+1\right)-\frac{3.51635\times10^{11}}{1.0793\times10^{-7}\,y+1}\right)=4.5\times10^{16}$$

Implicit plot



Alternate forms assuming x and y are real

$$\frac{8.50685\times10^{54}}{1.46519\times10^{26}\,x+3.22627\times10^{33}}=4.5\times10^{16}$$

$$\frac{8.50685\times10^{54}}{1.46519\times10^{26}\,x-\frac{3.51635\times10^{11}}{1.0793\times10^{-7}\,y+1}+3.22627\times10^{33}}+0=4.5\times10^{16}$$

Alternate forms

$$\left(x-1.2902\times10^{12}\right)y=1.1954\times10^{19}-9.26526\times10^{6}\,x$$

$$\frac{8.50685\times10^{54}\left(y+9.26526\times10^{6}\right)}{1.46519\times10^{26}\,x\,y+1.35753\times10^{33}\,x+3.22627\times10^{33}\,y+2.98922\times10^{40}}=4.5\times10^{16}$$

$$\frac{8.50685\times10^{54}\,y+7.88182\times10^{61}}{1.46519\times10^{26}\,x\,y+1.35753\times10^{33}\,x+3.22627\times10^{33}\,y+2.98922\times10^{40}}=4.5\times10^{16}$$

Alternate form assuming x and y are positive

$$x\left(-6.59334\times10^{42}\,y-6.1089\times10^{49}\right)+8.5067\times10^{54}\,y+7.88169\times10^{61}=0$$

Solution

$$1.56649\times10^{14}\,x-2.02108\times10^{26}\neq0,$$

$$y\approx-\frac{1.48034\times10^{6}\left(9.80443\times10^{14}\,x-1.26496\times10^{27}\right)}{1.56649\times10^{14}\,x-2.02108\times10^{26}},$$

$$5.08575\times10^{14}\,x^2+1.13651\times10^{27}\,x-3.30473\times10^{34}\neq0$$

Solution for the variable y

$$y\approx-\Big(\big(3.57914\times10^{7}\,(202\,126\,647\,792\,176\,959\,353\,520\,128\,x-260\,783\,148\,416\,843\,101\,776\,408\,384\,588\,490\,997\,760)\big)\Big/(780\,808\,200\,109\,640\,928\,781\,664\,256\,x-1\,007\,396\,218\,947\,047\,366\,677\,721\,218\,264\,630\,034\,432)\Big)$$

Implicit derivatives

$$\frac{\partial x(y)}{\partial y}=-\frac{501\,104\,055\,615\,611\,295\,777\,768\,539\,692\,899}{2\,970\,875\,485\,486\,482\,071\,221\,207\,040\,000\,(806\,958\,213\,657+87\,095\,y)^2}$$

$$\frac{\partial y(x)}{\partial x}=-\frac{2\,970\,875\,485\,486\,482\,071\,221\,207\,040\,000\,(806\,958\,213\,657+87\,095\,y)^2}{501\,104\,055\,615\,611\,295\,777\,768\,539\,692\,899}$$

From the following alternate form

$$\frac{8.50685\times10^{54}}{1.46519\times10^{26}\,x+3.22627\times10^{33}}=4.5\times10^{16}$$

we obtain:

(8.50685×10^54)/(1.46519×10^26 x + 3.22627×10^33) = 4.5×10^16

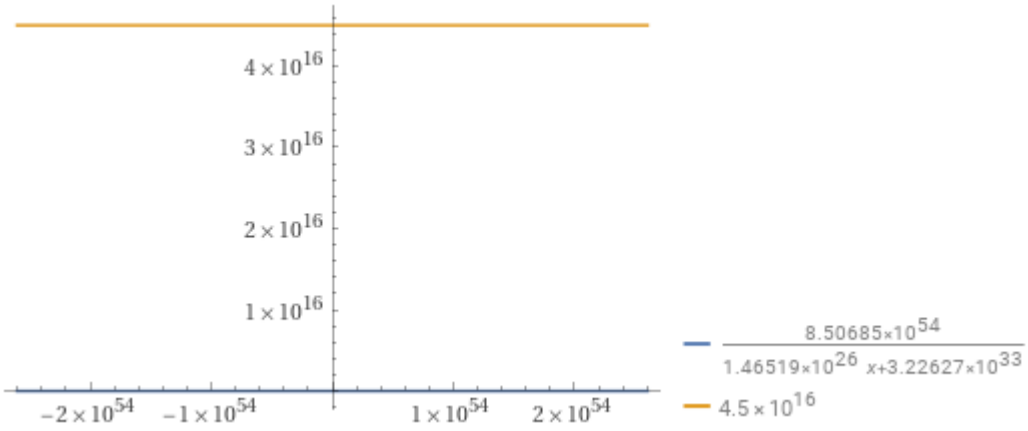
Input interpretation

$$\frac{8.50685\times10^{54}}{1.46519\times10^{26}\,x+3.22627\times10^{33}}=4.5\times10^{16}$$

Result

$$\frac{8.50685\times10^{54}}{1.46519\times10^{26}\,x+3.22627\times10^{33}}=4.5\times10^{16}$$

Plot



Alternate form assuming x is real

$$\frac{8.50685\times10^{54}}{1.46519\times10^{26}\,x+3.22627\times10^{33}}+0=4.5\times10^{16}$$

Alternate form assuming x is positive

$$6.59336\times 10^{42}\, x = 8.5067\times 10^{54} \quad (\text{for } x \neq -2.20195\times 10^{7})$$

Solution

$$x \approx 1.29019\times 10^{12}$$

$1.29019*10^{12} = x = \mu_m$

From the previous result

$$8.50685\times 10^{54} \Big/ \left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000 \left(4.54143\times 10^{-8}\, x + 1\right) - \frac{3.51635\times 10^{11}}{1.0793\times 10^{-7}\, y + 1}\right)$$

we obtain, for $x = 1.29019*10^{12}$:

(8.50685×10^54)/(3226266762397899821056000000000000 (4.54143×10^-8 (1.29019e+12) + 1) - (3.51635×10^11)/(1.0793×10^-7 y + 1)) = 4.5e+16

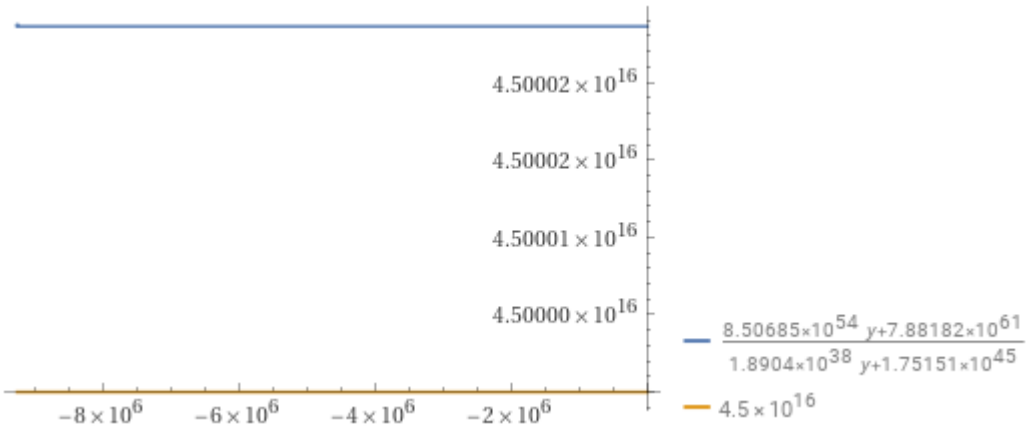
Input interpretation

$$\left(8.50685\times 10^{54}\right) \Big/ \left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000 \left(4.54143\times 10^{-8}\times 1.29019\times 10^{12} + 1\right) - \frac{3.51635\times 10^{11}}{1.0793\times 10^{-7}\, y + 1}\right) = 4.5\times 10^{16}$$

Result

$$\frac{8.50685\times 10^{54}}{1.8904\times 10^{38} - \frac{3.51635\times 10^{11}}{1.0793\times 10^{-7}\, y+1}} = 4.5\times 10^{16}$$

Plot



Alternate form assuming y is real

$$\frac{4.37835\times10^{45}}{1.8904\times10^{38}\,y+1.75151\times10^{45}}=2.36177\times10^{11}$$

Alternate forms

False

$$\frac{8.50685\times10^{54}\,(y+9.26526\times10^{6})}{1.8904\times10^{38}\,y+1.75151\times10^{45}}=4.5\times10^{16}$$

$$\frac{8.50685\times10^{54}\,y+7.88182\times10^{61}}{1.8904\times10^{38}\,y+1.75151\times10^{45}}=4.5\times10^{16}$$

Solution

$$y\approx-9.26526\times10^{6}$$

$-9.26526*10^6 = y = \mu_s$

Thence, from the previous expression, inserting the values of x and y, in conclusion we obtain:

(8.50685×10^54)/(3226266762397899821056000000000000 (4.54143×10^-8 (1.29019×10^12) + 1) - (3.51635×10^11)/(1.0793×10^-7 (9.26526×10^6) + 1))

Input interpretation

$$(8.50685\times10^{54})\Big/\left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\,(4.54143\times10^{-8}\times1.29019\times10^{12}+1)-\frac{3.51635\times10^{11}}{1.0793\times10^{-7}\,(-9.26526\times10^{6})+1}\right)$$

Result

$4.500023617651645185008788753462547619869225927337172663492 10... \times 10^{16}$

4.500023617651…*10^16

From which:

11^2*ln((8.50685×10^54)/(3226266762397899821056000000000000 (4.54143×10^-8 (1.29019×10^12) + 1) - (3.51635×10^11)/(1.0793×10^-7 (-9.26526×10^6) + 1)))-521-2*11-φ/2

Input interpretation

$$11^2\log\left((8.50685\times10^{54})\Big/\left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\,(4.54143\times10^{-8}\times1.29019\times10^{12}+1)-\frac{3.51635\times10^{11}}{1.0793\times10^{-7}\,(-9.26526\times10^{6})+1}\right)\right)-521-2\times11-\frac{\phi}{2}$$

$\log(x)$ is the natural logarithm

ϕ is the golden ratio

Result

4095.989723102771075338781550663884714039959294643877084708254887 6

…

4095.989723102771…. ≈ 4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

27sqrt(11^2*ln((8.50685×10^54)/(3226266762397899821056000000000000
(4.54143×10^-8 (1.29019×10^12) + 1) - (3.51635×10^11)/(1.0793×10^-7 (-
9.26526×10^6) + 1)))-521-2*11-φ/2)+1

Input interpretation

$$27\sqrt{\left(11^2\log\left(\left(8.50685\times10^{54}\right)\Big/\left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\left(4.54143\times10^{-8}\times1.29019\times10^{12}+1\right)-\frac{3.51635\times10^{11}}{1.0793\times10^{-7}\left(-9.26526\times10^{6}\right)+1}\right)\right)-521-2\times11-\frac{\phi}{2}\right)}+1$$

log(x) is the natural logarithm

ϕ is the golden ratio

Result

1728.997832215631025709375719629228824161044998223446364303878168 2
…

1728.997832215631….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(27√(11^2*ln((8.50685×10^54)/(3226266762397899821056000000000000(4.54143 ×10^-8 (1.29019×10^12)+1)-(3.51635×10^11)/(1.0793×10^-7(-9.26526×10^6)+1)))-521-2*11-φ/2)+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$$\left(27\sqrt{\left(11^2\log\left((8.50685\times10^{54})\Big/\left(3\,226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\,(4.54143\times10^{-8}\times1.29019\times10^{12}+1)-\frac{3.51635\times10^{11}}{1.0793\times10^{-7}\left(-9.26526\times10^{6}\right)+1}\right)\right)-521-2\times11-\frac{\phi}{2}\right)+1\right)\text{^}(1/15)+{C_{\text{MRB}}}^{1-1/(4\pi)+\pi}$$

log(x) is the natural logarithm

ϕ is the golden ratio

C_{MRB} is the MRB constant

Result

1.64493788673141532555946796903825881693454718772064602550320886 84
…

1.64493788673…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

From the indefinite integral result

$$\int \frac{8.50685\times10^{54}}{3226\,266\,762\,397\,899\,821\,056\,000\,000\,000\,000\left(1+4.54143\times10^{-8}\,x\right)-\frac{3.51635\times10^{11}}{1+1.0793\times10^{-7}\,y}}\,dx = \frac{\left(8.50685\times10^{54}\,y+7.88182\times10^{61}\right)\log\left(x\left(1.46519\times10^{26}\,y+1.35753\times10^{33}\right)+3.22627\times10^{33}\,y+2.98922\times10^{40}\right)}{1.46519\times10^{26}\,y+1.35753\times10^{33}}+$$

constant

(assuming a complex-valued logarithm)

we obtain:

((7.88182×10^61 + 8.50685×10^54 y) log(2.98922×10^40 + 3.22627×10^33 y + x (1.35753×10^33 + 1.46519×10^26 y)))/(1.35753×10^33 + 1.46519×10^26 y)

Input interpretation

$$\left(\left(7.88182\times10^{61}+8.50685\times10^{54}\,y\right)\log\left(2.98922\times10^{40}+3.22627\times10^{33}\,y+x\left(1.35753\times10^{33}+1.46519\times10^{26}\,y\right)\right)\right)/\left(1.35753\times10^{33}+1.46519\times10^{26}\,y\right)$$

$\log(x)$ is the natural logarithm

Result

$$\left(\left(8.50685\times10^{54}\,y+7.88182\times10^{61}\right)\log\left(x\left(1.46519\times10^{26}\,y+1.35753\times10^{33}\right)+3.22627\times10^{33}\,y+2.98922\times10^{40}\right)\right)/\left(1.46519\times10^{26}\,y+1.35753\times10^{33}\right)$$

Expanded forms

$$
\begin{aligned}
&(8\,506\,849\,999\,999\,999\,585\,566\,833\,161\,821\,794\,664\,181\,469\,480\,107\,376\,640\\
&\quad y \log(x\,(146\,518\,999\,999\,999\,999\,322\,619\,904\ y +\\
&\qquad 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960) +\\
&\qquad 3\,226\,269\,999\,999\,999\,755\,299\,120\,882\,909\,184\ y +\\
&\qquad 29\,892\,199\,999\,999\,997\,748\,023\,714\,971\,104\,116\,211\,712))/\\
&\quad (146\,518\,999\,999\,999\,999\,322\,619\,904\ y +\\
&\qquad 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960) +\\
&(78\,818\,200\,000\,000\,005\,095\,644\,845\,653\,085\,864\,760\,421\,646\,543\,928\,549\,439\,438\ddots.\\
&\quad 848 \log(x\,(146\,518\,999\,999\,999\,999\,322\,619\,904\ y +\\
&\qquad 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960) +\\
&\qquad 3\,226\,269\,999\,999\,999\,755\,299\,120\,882\,909\,184\ y +\\
&\qquad 29\,892\,199\,999\,999\,997\,748\,023\,714\,971\,104\,116\,211\,712))/\\
&\quad (146\,518\,999\,999\,999\,999\,322\,619\,904\ y +\\
&\qquad 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960)
\end{aligned}
$$

$$
\begin{aligned}
&(8\,506\,849\,999\,999\,999\,585\,566\,833\,161\,821\,794\,664\,181\,469\,480\,107\,376\,640\\
&\quad y \log(146\,518\,999\,999\,999\,999\,322\,619\,904\ x\ y +\\
&\qquad 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960\ x +\\
&\qquad 3\,226\,269\,999\,999\,999\,755\,299\,120\,882\,909\,184\ y +\\
&\qquad 29\,892\,199\,999\,999\,997\,748\,023\,714\,971\,104\,116\,211\,712))/\\
&\quad (146\,518\,999\,999\,999\,999\,322\,619\,904\ y +\\
&\qquad 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960) +\\
&(78\,818\,200\,000\,000\,005\,095\,644\,845\,653\,085\,864\,760\,421\,646\,543\,928\,549\,439\,438\ddots.\\
&\quad 848 \log(146\,518\,999\,999\,999\,999\,322\,619\,904\ x\ y +\\
&\qquad 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960\ x +\\
&\qquad 3\,226\,269\,999\,999\,999\,755\,299\,120\,882\,909\,184\ y +\\
&\qquad 29\,892\,199\,999\,999\,997\,748\,023\,714\,971\,104\,116\,211\,712))/\\
&\quad (146\,518\,999\,999\,999\,999\,322\,619\,904\ y +\\
&\qquad 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960)
\end{aligned}
$$

Alternate form

$$
\begin{aligned}
&\left(8.50685\times 10^{54}\ y \log\left(x\left(1.46519\times 10^{26}\ y + 1.35753\times 10^{33}\right) +\right.\right.\\
&\qquad \left. 3.22627\times 10^{33}\ y + 2.98922\times 10^{40}\right) +\\
&\quad 7.88182\times 10^{61} \log\left(x\left(1.46519\times 10^{26}\ y + 1.35753\times 10^{33}\right) +\right.\\
&\qquad \left.\left. 3.22627\times 10^{33}\ y + 2.98922\times 10^{40}\right)\right)/\\
&\left(1.46519\times 10^{26}\ y + 1.35753\times 10^{33}\right)
\end{aligned}
$$

Roots

$$8.52853\times10^{15}\,x+1.87794\times10^{23}\neq0\,,$$

$$y\approx-\frac{5.23869\times10^{-10}\left(1.50837\times10^{32}\,x+3.32136\times10^{39}\right)}{8.52853\times10^{15}\,x+1.87794\times10^{23}}$$

$$1.3849\times10^{25}\,x+7.70579\times10^{31}\neq0\,,\quad y\approx-9.26526\times10^{6}$$

Properties as a function

Domain

$$\left\{(x,y)\in\mathbb{R}^2 : y\neq-\frac{1\,357\,530\,000\,000}{146\,519}\ \text{and}\ x\,(146\,519\,y+1\,357\,530\,000\,000)+10\,000\,000\,(322\,627\,y+2\,989\,220\,000\,000)>0\right\}$$

Range

$\mathbb{R}$ (all real numbers)

$\mathbb{R}$ is the set of real numbers

Series expansion at x=∞

$$\frac{\left(8.50685\times10^{54}\,y+7.88182\times10^{61}\right)\log\left(x\left(1.46519\times10^{26}\,y+1.35753\times10^{33}\right)\right)}{1.46519\times10^{26}\,y+1.35753\times10^{33}}+\frac{2.74454\times10^{88}\,y^2+5.08577\times10^{95}\,y+2.35605\times10^{102}}{x\left(1.46519\times10^{26}\,y+1.35753\times10^{33}\right)^2}-\frac{0.5\left(\left(3.22627\times10^{33}\,y+2.98922\times10^{40}\right)^2\left(8.50685\times10^{54}\,y+7.88182\times10^{61}\right)\right)}{x^2\left(1.46519\times10^{26}\,y+1.35753\times10^{33}\right)^3}+\left(9.52247\times10^{154}\,y^4+3.52912\times10^{162}\,y^3+4.90473\times10^{169}\,y^2+3.02957\times10^{176}\,y+7.01744\times10^{182}\right)/\left(x^3\left(1.46519\times10^{26}\,y+1.35753\times10^{33}\right)^4\right)+O\left(\left(\frac{1}{x}\right)^4\right)$$

(Puiseux series)

Partial derivatives

$$\frac{\partial}{\partial x}(((8\,506\,849\,999\,999\,999\,585\,566\,833\,161\,821\,794\,664\,181\,469\,480\,107\,376\,640\,y + 78\,818\,200\,000\,000\,005\,095\,644\,845\,653\,085\,864\,760\,421\,646\,543\,928\,549\,439\,438\,848)\log(x\,(146\,518\,999\,999\,999\,999\,322\,619\,904\,y + 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960) + 3\,226\,269\,999\,999\,999\,755\,299\,120\,882\,909\,184\,y + 29\,892\,199\,999\,999\,997\,748\,023\,714\,971\,104\,116\,211\,712))/(146\,518\,999\,999\,999\,999\,322\,619\,904\,y + 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960)) = (8\,506\,849\,999\,999\,999\,585\,566\,833\,161\,821\,794\,664\,181\,469\,480\,107\,376\,640\,y + 78\,818\,200\,000\,000\,005\,095\,644\,845\,653\,085\,864\,760\,421\,646\,543\,928\,549\,439\,438\,848)/(146\,518\,999\,999\,999\,999\,322\,619\,904\,x\,y + 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960\,x + 3\,226\,269\,999\,999\,999\,755\,299\,120\,882\,909\,184\,y + 29\,892\,199\,999\,999\,997\,748\,023\,714\,971\,104\,116\,211\,712)$$

$$\frac{\partial}{\partial y}(((8\,506\,849\,999\,999\,999\,585\,566\,833\,161\,821\,794\,664\,181\,469\,480\,107\,376\,640\,y + 78\,818\,200\,000\,000\,005\,095\,644\,845\,653\,085\,864\,760\,421\,646\,543\,\ddots 928\,549\,439\,438\,848)\log(x\,(146\,518\,999\,999\,999\,999\,322\,619\,904\,y + 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960) + 3\,226\,269\,999\,999\,999\,755\,299\,120\,882\,909\,184\,y + 29\,892\,199\,999\,999\,997\,748\,023\,714\,971\,104\,116\,211\,712))/(146\,518\,999\,999\,999\,999\,322\,619\,904\,y + 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960)) = (x(182\,623\,502\,117\,422\,825\,275\,195\,955\,382\,582\,800\,022\,192\,874\,206\,517\,\ddots 656\,673\,444\,974\,292\,205\,549\,732\,645\,025\,642\,792\,644\,004\,895\,483\,\ddots 171\,438\,592\,y^2 + 3\,384\,100\,687\,893\,549\,158\,591\,223\,285\,932\,409\,788\,874\,857\,690\,347\,\ddots 278\,273\,123\,063\,770\,784\,603\,764\,158\,126\,089\,231\,951\,984\,662\,359\,\ddots 141\,308\,152\,623\,923\,200\,y + 15\,677\,250\,371\,588\,875\,798\,059\,756\,601\,330\,498\,739\,832\,228\,536\,403\,\ddots 351\,100\,986\,821\,289\,931\,678\,896\,048\,561\,597\,652\,857\,215\,562\,321\,\ddots 918\,569\,087\,888\,373\,997\,109\,248) + (x(-8\,756\,751\,991\,613\,342\,292\,154\,224\,330\,495\,820\,217\,796\,433\,738\,\ddots 478\,412\,039\,810\,623\,721\,329\,649\,073\,140\,905\,205\,086\,141\,\ddots 438\,857\,378\,714\,148\,143\,104\,y - 81\,133\,187\,709\,979\,952\,772\,773\,484\,148\,891\,857\,788\,530\,559\,\ddots 760\,513\,380\,790\,116\,965\,610\,076\,556\,848\,835\,730\,543\,409\,\ddots 268\,882\,084\,345\,777\,095\,135\,358\,615\,552) - 192\,818\,994\,433\,242\,091\,447\,963\,594\,932\,965\,413\,532\,948\,783\,282\,\ddots 722\,710\,806\,602\,736\,579\,715\,793\,388\,248\,336\,717\,755\,094\,765\,542\,\ddots 907\,557\,577\,999\,670\,837\,248\,y - 1\,786\,516\,300\,701\,868\,199\,399\,981\,605\,026\,487\,269\,458\,541\,483\,880\,\ddots 280\,805\,139\,314\,656\,708\,145\,416\,867\,841\,342\,899\,452\,101\,082\,201\,\ddots 363\,224\,017\,599\,146\,353\,542\,299\,648)\log(146\,518\,999\,999\,999\,999\,322\,619\,904\,x\,y + 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960\,x + 3\,226\,269\,999\,999\,999\,755\,299\,120\,882\,909\,184\,y + 29\,892\,199\,999\,999\,997\,748\,023\,714\,971\,104\,116\,211\,712) + 4\,021\,271\,822\,605\,790\,073\,662\,430\,376\,958\,546\,699\,574\,509\,729\,660\,471\,241\,\ddots 800\,367\,417\,149\,728\,836\,018\,366\,766\,061\,911\,225\,538\,372\,341\,065\,094\,\ddots 810\,042\,368\,y^2 + 74\,516\,086\,830\,583\,889\,574\,672\,613\,250\,802\,711\,949\,795\,529\,972\,408\,278\,\ddots 266\,292\,309\,805\,011\,234\,144\,290\,832\,377\,881\,270\,559\,978\,877\,570\,372\,\ddots 356\,090\,045\,354\,999\,808\,y + 345\,204\,666\,673\,578\,401\,286\,729\,892\,678\,940\,596\,720\,882\,427\,986\,279\,451\,\ddots 880\,307\,679\,460\,066\,574\,724\,909\,453\,871\,133\,582\,944\,741\,935\,169\,968\,\ddots 746\,633\,307\,040\,738\,057\,388\,032)/((146\,518\,999\,999\,999\,999\,322\,619\,904\,y + 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960)^2(146\,518\,999\,999\,999\,999\,322\,619\,904\,x\,y + 1\,357\,530\,000\,000\,000\,037\,540\,842\,134\,568\,960\,x + 3\,226\,269\,999\,999\,999\,755\,299\,120\,882\,909\,184\,y + 29\,892\,199\,999\,999\,997\,748\,023\,714\,971\,104\,116\,211\,712))$$

Indefinite integral

$$\int \frac{(7.88182\times10^{61}+8.50685\times10^{54}\ y)\log(2.98922\times10^{40}+3.22627\times10^{33}\ y+x(1.35753\times10^{33}+1.46519\times10^{26}\ y))}{1.35753\times10^{33}+1.46519\times10^{26}\ y}\,dx =$$
$$((8.50685\times10^{54}\ y+7.88182\times10^{61})(x(-1.46519\times10^{26}\ y-1.35753\times10^{33})+$$
$$(x(1.46519\times10^{26}\ y+1.35753\times10^{33})+3.22627\times10^{33}\ y+$$
$$2.98922\times10^{40})\log(1.46519\times10^{26}\ x\ y+$$
$$1.35753\times10^{33}\ x+3.22627\times10^{33}\ y+2.98922\times10^{40})))/$$
$$(1.46519\times10^{26}\ y+1.35753\times10^{33})^2 + \text{constant}$$

(assuming a complex-valued logarithm)

And again, from the indefinite integral result

$$\int \frac{(7.88182\times10^{61}+8.50685\times10^{54}\ y)\log(2.98922\times10^{40}+3.22627\times10^{33}\ y+x(1.35753\times10^{33}+1.46519\times10^{26}\ y))}{1.35753\times10^{33}+1.46519\times10^{26}\ y}\,dx =$$
$$((8.50685\times10^{54}\ y+7.88182\times10^{61})(x(-1.46519\times10^{26}\ y-1.35753\times10^{33})+$$
$$(x(1.46519\times10^{26}\ y+1.35753\times10^{33})+3.22627\times10^{33}\ y+$$
$$2.98922\times10^{40})\log(1.46519\times10^{26}\ x\ y+$$
$$1.35753\times10^{33}\ x+3.22627\times10^{33}\ y+2.98922\times10^{40})))/$$
$$(1.46519\times10^{26}\ y+1.35753\times10^{33})^2 + \text{constant}$$

(assuming a complex-valued logarithm)

((8.50685×10^54 y + 7.88182×10^61) (x (-1.46519×10^26 y - 1.35753×10^33) + (x (1.46519×10^26 y + 1.35753×10^33) + 3.22627×10^33 y + 2.98922×10^40) log(1.46519×10^26 x y + 1.35753×10^33 x + 3.22627×10^33 y + 2.98922×10^40)))/(1.46519×10^26 y + 1.35753×10^33)^2

for $1.29019*10^{12} = x = \mu_m$; $-9.26526*10^6 = y = \mu_s$:

((8.50685×10^54 (-9.26526*10^6) + 7.88182×10^61) ((1.29019*10^12) (-1.46519×10^26 (-9.26526*10^6) - 1.35753×10^33) + ((1.29019*10^12) (1.46519×10^26 (-9.26526*10^6)

Input interpretation

$$\left(8.50685\times 10^{54}\left(-9.26526\times 10^{6}\right)+7.88182\times 10^{61}\right)\left(1.29019\times 10^{12}\left(-1.46519\times 10^{26}\left(-9.26526\times 10^{6}\right)-1.35753\times 10^{33}\right)+1.29019\times 10^{12}\left(1.46519\times 10^{26}\left(-9.26526\times 10^{6}\right)\right)\right)$$

Result

$$-40\,229\,551\,885\,548\,300\,000\,000\,000

Alternate complex forms

$$2\,718\,611\,977\,306\,641\,480\,267\,848\,891\,536\,929\,112\,195\,072 + 93\,909\,115\,919\,636\,815\,633\,843\,290\,621\,361\,378\,033\,664\,i$$

$$2\,720\,233\,446\,821\,786\,241\,040\,076\,254\,316\,830\,734\,155\,776 (\cos(0.0345293) + i \sin(0.0345293))$$

$$2\,720\,233\,446\,821\,786\,241\,040\,076\,254\,316\,830\,734\,155\,776\, e^{0.0345293\,i}$$

i is the imaginary unit

Polar coordinates

$r = 2\,720\,233\,446\,821\,786\,241\,040\,076\,254\,316\,830\,734\,155\,776$ (radius), $\theta = 0.0345293$ (angle)

$2.720233446821786241040076254316830734155776 \times 10^{42}$

((-4.02295518855483×10^100 + 1.35753×10^33) + 2.720233446821786241 × 10^42 + 3.22627×10^33 (-9.26526*10^6) + 2.98922×10^40)))/(1.46519×10^26 (-9.26526*10^6) + 1.35753×10^33)^2

Input interpretation

$$((-(4.02295518855483 \times 10^{100}) + 1.35753 \times 10^{33}) + 2.720233446821786241 \times 10^{42} + 3.22627 \times 10^{33} (-9.26526 \times 10^{6}) + 2.98922 \times 10^{40}) / (1.46519 \times 10^{26} (-9.26526 \times 10^{6}) + 1.35753 \times 10^{33})^2$$

Result

$$-9.152210468008057654790058976262595911148455974635130734908\ldots \times 10^{44}$$

$-9.152210468…*10^{44}$

From which:

((-((((-4.02295518855483×10^100 + 1.35753×10^33) + 2.720233446821786241 × 10^42 + 3.22627×10^33 (-9.26526*10^6) + 2.98922×10^40)))/(1.46519×10^26 (-9.26526*10^6) + 1.35753×10^33)^2))^1/14+89+13-γ

Input interpretation

$$\left(-\left(\left(\left(-\left(4.02295518855483\times 10^{100}\right)+1.35753\times 10^{33}\right)+2.720233446821786241\times 10^{42}+3.22627\times 10^{33}\left(-9.26526\times 10^{6}\right)+2.98922\times 10^{40}\right)\Big/\left(1.46519\times 10^{26}\left(-9.26526\times 10^{6}\right)+1.35753\times 10^{33}\right)^{2}\right)\right)\text{ ^ }(1/14)+89+13-\gamma$$

γ is the Euler-Mascheroni constant

Result

1728.984896255503590000408069842747838132060784291271475500422142 1…

1728.9848962555….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(1/27((((-((((-4.02295518855483e+100 + 1.35753e+33) +
2.7202334468217862 41e+42 + 3.22627×10^33 (-9.26526*10^6) +
2.98922×10^40)))/(1.46519×10^26 (-9.26526*10^6) +
1.35753e+33)^2))^1/14+89+13-γ)-1))^2

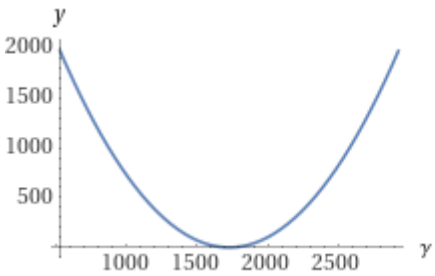
Input interpretation

$$\left(\frac{1}{27}\left(\left(\left(-\left(\left(-\left(4.02295518855483\times 10^{100}\right)+1.35753\times 10^{33}\right)+2.720233446821786241\times 10^{42}+3.22627\times 10^{33}\left(-9.26526\times 10^{6}\right)+2.98922\times 10^{40}\right)\right/\left(1.46519\times 10^{26}\left(-9.26526\times 10^{6}\right)+1.35753\times 10^{33}\right)^{2}\right)\right)\text{^}(1/14)+89+13-\gamma\right)-1\right)\right)^{2}$$

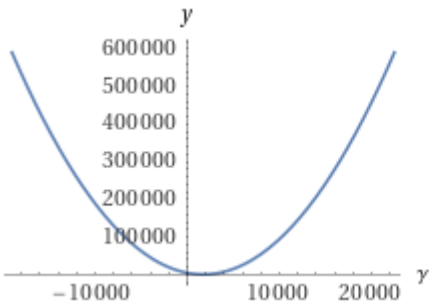
Result

$$\frac{1}{729}(1728.56-\gamma)^2$$

Plots (figures that can be related to the open strings)



(γ from 530.3 to 2927)



(γ from −19014 to 22471)

Geometric figure

parabola

Expanded form

$$\frac{\gamma^2}{729}-4.74228\,\gamma+4098.67$$

Alternate forms

$$(0.00137174\,\gamma-4.74228)\,\gamma+4098.67$$

$$0.00137174\,(\gamma-1728.56)\,(\gamma-1728.56)$$

$$\frac{1}{729}(\gamma - 1728.56)^2$$

Roots

$\gamma \approx 1728.56$

$\gamma \approx 1728.56$

Polynomial discriminant

$\Delta = 0$

Derivative

$$\frac{d}{d\gamma}\left(\frac{1}{729}(1728.56 - \gamma)^2\right) = -0.00274348\,(1728.56 - \gamma)$$

Indefinite integral

$$\int \frac{1}{729}(1728.56 - \gamma)^2\,d\gamma = 0.000457247\,\gamma^3 - 2.37114\,\gamma^2 + 4098.67\,\gamma + \text{constant}$$

Global minimum

$$\min\left\{\frac{1}{729}(1728.56 - \gamma)^2\right\} = 0 \text{ at } \gamma = \frac{4\,060\,853\,927}{2\,349\,267}$$

Definite integral after subtraction of diverging parts

$$\int_0^\infty \frac{1}{729}(1728.56 - \gamma)^2 - \left(4098.67 - 4.74228\,\gamma + \frac{\gamma^2}{729}\right)d\gamma = 0$$

From the result

$$\frac{1}{729}(1728.56-\gamma)^2$$

we obtain:

1/729 (1728.56 - γ)^2

Input interpretation

$$\frac{1}{729}(1728.56-\gamma)^2$$

γ is the Euler-Mascheroni constant

Result

4095.92…

4095.92…. ≈ 4096

The number $4096 = 64^2$, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry.

Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero.
Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternative representations

$$\frac{1}{729}(1728.56-\gamma)^2=\frac{1}{729}(1728.56+\psi(1))^2$$

$$\frac{1}{729}(1728.56-\gamma)^2=\frac{1}{729}(1728.56-\gamma_0)^2$$

$\psi(x)$ is the digamma function

γ_n is the n^{th} Stieltjes constant

Series representations

$$\frac{1}{729}(1728.56-\gamma)^2=0.00137174\left(-1727.56+\sum_{k=2}^{\infty}\left(\frac{1}{k}+\log\left(\frac{-1+k}{k}\right)\right)\right)^2$$

$$\frac{1}{729}(1728.56-\gamma)^2=0.00137174\left(-1728.56+\sum_{k=1}^{\infty}\left(\frac{1}{k}-\log\left(1+\frac{1}{k}\right)\right)\right)^2$$

$$\frac{1}{729}(1728.56-\gamma)^2=0.00137174\left(1727.56+\sum_{k=2}^{\infty}\frac{-1+\zeta(k)}{k}\right)^2$$

$\log(x)$ is the natural logarithm

$\zeta(s)$ is the Riemann zeta function

Integral representations

$$\frac{1}{729}(1728.56-\gamma)^2 = 0.00137174\left(1728.56+\int_0^1 \log\left(\log\left(\frac{1}{t}\right)\right)dt\right)^2$$

$$\frac{1}{729}(1728.56-\gamma)^2 = 0.00137174\left(1728.56+\int_0^1 \log(-\log(t))\,dt\right)^2$$

$$\frac{1}{729}(1728.56-\gamma)^2 = 0.00137174\left(1728.56+\int_0^\infty e^{-t}\log(t)\,dt\right)^2$$

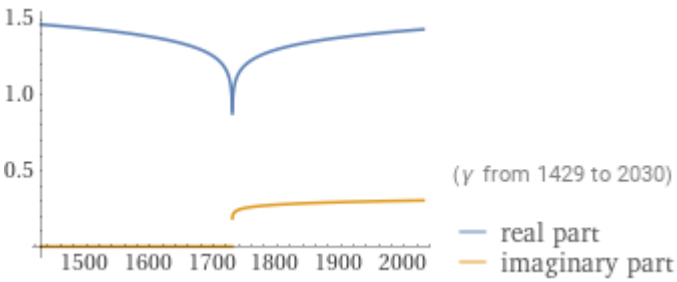
(((-((((-4.02295518855483e+100+1.35753e+33)+2.7202334468217862 41e+42 + 3.22627e+33 (-9.26526e+6)+2.98922e+40)))/(1.46519e+26 (-9.26526e+6)+1.35753e+33)^2))^1/14+89+13-γ)^1/15+(MRB const)^(1-1/(4π)+π)

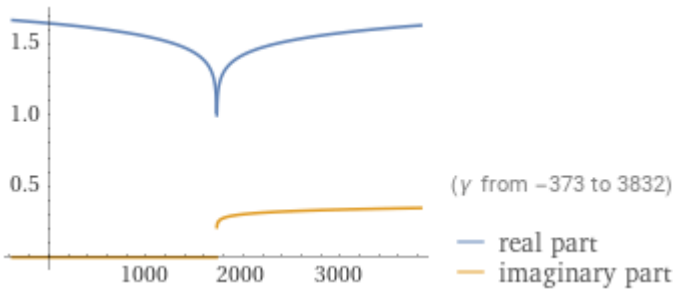
Input interpretation

$$\left(\left(-\left(\left(\left(-\left(4.02295518855483\times 10^{100}\right)+1.35753\times 10^{33}\right)+2.7202334468217862\times 10^{42}+3.22627\times 10^{33}\left(-9.26526\times 10^{6}\right)+2.98922\times 10^{40}\right)\right)/\left(1.46519\times 10^{26}\left(-9.26526\times 10^{6}\right)+1.35753\times 10^{33}\right)^2\right)\right)\,\hat{}\,(1/14)+89+13-\gamma\right)\,\hat{}\,(1/15)+{C_{\text{MRB}}}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Plots (figures that can be related to the open strings)





Alternate form

$$C_{\text{MRB}}^{-1/(4\pi)}\left(\sqrt[15]{1729.56-\gamma}\;\sqrt[4\pi]{C_{\text{MRB}}}+C_{\text{MRB}}^{1+\pi}\right)$$

Series expansion at $\gamma=0$

$$1.64497-0.0000633629\,\gamma-1.70964\times10^{-8}\,\gamma^2-6.37023\times10^{-12}\,\gamma^3-2.70097\times10^{-15}\,\gamma^4+O(\gamma^5)$$

(Taylor series)

Series expansion at $\gamma=\infty$

$$\frac{\sqrt[15]{-\gamma}\;\sqrt[15]{\gamma}}{\sqrt[15]{\gamma}}+C_{\text{MRB}}^{1-1/(4\pi)+\pi}-\frac{115.304\,\sqrt[15]{-\gamma}\left(\frac{1}{\gamma}\right)^{14/15}}{\sqrt[15]{\gamma}}-\frac{93\,065.3\,\sqrt[15]{-\gamma}\left(\frac{1}{\gamma}\right)^{29/15}}{\sqrt[15]{\gamma}}-\frac{1.03731\times10^{8}\,\sqrt[15]{-\gamma}\left(\frac{1}{\gamma}\right)^{44/15}}{\sqrt[15]{\gamma}}+O\left(\left(\frac{1}{\gamma}\right)^3\right)$$

(generalized Puiseux series)

From the alternate form

$$C_{\text{MRB}}^{-1/(4\pi)}\left(\sqrt[15]{1729.56-\gamma}\;\sqrt[4\pi]{C_{\text{MRB}}}+C_{\text{MRB}}^{1+\pi}\right)$$

we obtain:

(MRB const)^(-1/(4 π)) ((1729.56 - γ)^(1/15) (MRB const)^(1/(4 π)) + (MRB const)^(1 + π))

Input interpretation

$$C_{\text{MRB}}{}^{-1/(4\pi)}\left(\sqrt[15]{1729.56-\gamma}\;\sqrt[4\pi]{C_{\text{MRB}}}+C_{\text{MRB}}{}^{1+\pi}\right)$$

C_{MRB} is the MRB constant

γ is the Euler-Mascheroni constant

Result

1.64493693295988682543918302182913872045723100862633603307806745 39
…

1.644936932…. ≈ $\zeta(2) = \pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

In **October 27, 1831** a strong earthquake hit Umbria.

4 Novembre 1831 13:22:33 Luna Nuova 11°24'22 400791.38 km

let's add to that date a Saros cycle:

October 27, 1831 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Thursday, October 27, 1831 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am LMT | Wednesday, November 7, 1849

7.11.1849

1849-11-28 18 Val di Taro Mw 4.63

November 30, 1849 03:25:23 Full Moon 07°52'14 359242.15 km

November 7, 1849 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Wednesday, November 7, 1849 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am RMT | Monday, November 18, 1867

18.11.1867

1867-11-01 16:15 Siena Mw 4.16

27 October 1867 13:03:09 New Moon 03°39'26 389315.69 km

November 18, 1867 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Monday, November 18, 1867 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am RMT | Sunday, November 29, 1885

29.11.1885

November 15, 1885 – Eathquake in Eolie islands – Mw 5.0

November 14, 1885 21:59:38 First quarter 22°44'31 402634.85 km

November 22, 1885 09:39:16 Full Moon 00°17'57 368236.04 km

November 29, 1885 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Sunday, November 29, 1885 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Thursday, December 10, 1903

10.12.1903

1903-12-07 05:58 Beneventano Mw 4.14

1903-12-14 22:21 Tirol, Gallzein/Jenbac Mw 4.16

4 December 1903 18:12:39 Full Moon 11°25'53 369176.19 km

18 December 1903 21:25:48 New Moon 25°48'05 397447.60 km

December 10, 1903 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Thursday, December 10, 1903 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Wednesday, December 21, 1921

21.12.1921

1921-12-13 06:30 Steiermark, Stuhlfelden (Austria) Mw 4.40

15 December 1921 02:50:14 Full Moon 22°36'30 370134.21 km

December 21, 1921 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Wednesday, December 21, 1921 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Monday, January 1, 1940

01.01.1940

1940-01-03 19:15 Feltrino (Veneto) Mw 4.40

January 9, 1940 13:52:33 New Moon 18°09'51 395614.64 km

January 1, 1940 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Monday, January 1, 1940 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Sunday, January 12, 1958

12.01.1958

1958-01-09 11:58 Monte Baldo (Veneto) Mw 4.16

1958-01-15 15:11 Carinthia, Villacher Alpe (Austria) Mw 4.40

19 January 1958 22:07:47 New Moon 29°20'57 394659.95 km

5 January 1958 20:08:49 Full Moon 15°00'11 372127.40 km

January 12, 1958 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Sunday, January 12, 1958 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Friday, January 23, 1976

23.01.1976

January 20, 1976 – Eathquake in Fiastra (Marche)

January 29, 1976 – Earthquake in Switzerland

23 January 1976 23:04:21 Last quarter 03°04'47 371449.04 km

31 January 1976 06:20:10 New Moon 10°30'12 393672.62 km

January 23, 1976 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Friday, January 23, 1976 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Thursday, February 3, 1994

03.02.1994

1994-01-05 08:49 Monti della Laga (Abruzzo) Mw 3.47

1994-01-05 13:24 Tirreno meridionale Mw 5.82

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5 January 1994 00:00:32 Last quarter 14°24'51 370368.56 km

11 January 1994 23:10:21 New Moon 21°30'51 381422.02 km

February 3, 1994 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Thursday, February 3, 1994 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Tuesday, February 14, 2012

14.02.2012

2012-01-27 14:53 Appennino parmense Mw 5.05

2012-02-25 20:34 Tirreno meridionale (A nord della costa siciliana) Mw 4.43

23 January 2012 07:39:17 New Moon 02°41'35 380315.61 km

21 February 2012 22:34:35 New Moon 02°42'04 391609.89 km

Furthermore, we note that, from the first date, we obtain also:

October 27, 1831 - 18 years 11 days 8 hours 42 minutes

Input interpretation

Thursday, October 27, 1831 – 18 years 11 days 8 hours 42 minutes

Result

3:18 pm LMT | Friday, October 15, 1813

15.10.1813

October 16, 1813 – Eathquake in Castrocaro (Emilia-Romagna) - Mw 5.0

10 October 1813 00:18:36 Full Moon 16°18'15 364702.71 km

16 October 1813 15:19:24 Last quarter 22°52'24 374515.25 km

29/03/2006	11.15	Eclisse totale.	Settentrionale	5.58	18.32
22/09/2006	12.41	Eclisse anulare.	Meridionale	5.57	18.08

March 29, 2006 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Wednesday, March 29, 2006 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Tuesday, April 9, 2024

Although the number of recorded events increased in April, no earthquakes with a magnitude greater than or equal to 4.0 were located in Italy. The strongest events occurred on **2 and 3 April** (ML 4.3 and Mb 4.9) in Montenegro. In Italy, the increase in seismicity is probably linked to some small sequences, in particular in the province of Florence (near Barberino del Mugello), in the province of Reggio Calabria (near Cittanova) and the various seismic swarms recorded in the Campi Flegrei area. It is precisely in this area that the two events with the highest magnitude were located: the one with a magnitude of Md 3.7 on **14 April** and the one with a magnitude of Md 3.9 on **27 April**.

April 2, 2024	03:14:43	Last quarter	12°52'21	379148.24 km
April 8, 2024	18:20:51	New Moon	19°24'02	359807.76 km
April 15, 2024	19:13:06	First quarter	26°18'09	395670.05 km
April 23, 2024	23:48:58	Full Moon	04°17'59	399780.51 km

September 22, 2006 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Friday, September 22, 2006 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Thursday, October 3, 2024

According to the theory we are analyzing, next October 2nd there will be a Syzygy tide (New Moon) and an annular eclipse:

2 October 2024 18:49:16 New Moon 10°03'48 406514.58 km

02/10/2024	19.46	Eclisse anulare.	Meridionale	6.08	17.49

We therefore predict that, by the end of September/beginning of October (from 2 to 10 October), the Italian peninsula will be affected by a maximum of seismic activity. (Forecast made on 08/09/2024 by Dr. Michele Nardelli)

The **Val di Noto earthquake** of January 9 and 11, 1693 represents, together with the earthquakes of 1169 and 1908, the largest catastrophic event to have hit eastern Sicily in historical times. According to recent studies, in reality it could be two separate events. With a moment magnitude of 7.31, it is considered the strongest earthquake ever recorded in the entire Italian territory.

Let's add 5 Saros cycles to that date:

January 9, 1693 + 90 years 56 days 19 hours 30 minutes

Input interpretation

Friday, January 9, 1693 (Gregorian calendar) +
90 years 56 days 19 hours 30 minutes

Result

7:30 pm LMT | Thursday, March 6, 1783

06.03.1783

This date is connected to that of the **1783 southern Calabria earthquake** (also called the 1783 Reggio and Messina earthquake) and refers to an intense seismic sequence that hit the area of the Strait of Messina and southern Calabria, culminating with 5 strong shocks, greater than Mw 5.9, between 5 February and 28 March 1783.

Now, repeating the same previous calculation, we have:

March 6, 1783 + 90 years 56 days 19 hours 30 minutes

Input interpretation

Thursday, March 6, 1783 + 90 years 56 days 19 hours 30 minutes

Result

7:30 pm RMT | Thursday, May 1, 1873

01.05.1873

This date is close to that of the following earthquake

1873-05-16 19:35 Reggiano Mw = 5.01

And again:

May 1, 1873 + 90 years 56 days 19 hours 30 minutes

Input interpretation

Thursday, May 1, 1873 + 90 years 56 days 19 hours 30 minutes

Result

7:30 pm CET | Wednesday, June 26, 1963

26.06.1963

Date close to the following seismic events:

1963-06-13	08:37	Isole Eolie	Mw = 4.67
1963-06-27		Briançonnais	Mw = 3.89

Now, let's do the following sum:

June 26, 1963 + 36 years 22 days 17 hours 24 minutes

Input interpretation

Wednesday, June 26, 1963 + 36 years 22 days 17 hours 24 minutes

Result

5:24 pm CEST | Sunday, July 18, 1999

18.07.1999

Date close to the following seismic event:

1999-07-07	17:16	Frignano	Mw = 4.67

And finally:

Jul 18, 1999 + 18 years 11 days 8 hours 42 minutes

Input interpretation

Sunday, July 18, 1999 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CEST | Saturday, July 29, 2017

29.07.2017

Date close to the following earthquakes:

2017-07-22	02:13	Monti della Laga	Mw = 4.31
2017-08-08	20:42	Costa Croata Settentrionale	Mw = 4.05

Note that, by subtracting 11 Saros cycles from the initial date, we obtain:

January 9, 1693 - 198 years 124 days 23 hours 42 minutes

nput interpretation

Friday, January 9, 1693 (Gregorian calendar) –
198 years 124 days 23 hours 42 minutes

Result

12:18 am LMT | Thursday, September 6, 1494

06.09.1494

Date close to the following earthquake:

1494-09-01	22:40	Messina	M = 4.5

In conclusion, subtracting 12 Saros cycles from the previous date, we obtain:

Sep 6, 1494 - 216 years 136 days 8 hours 24 minutes

Input interpretation

Thursday, September 6, 1494 (extrapolated Gregorian calendar) –
216 years 136 days 8 hours 24 minutes

Result

3:36 pm LMT | Friday, April 22, 1278

22.04.1278

Date close to that of the following seismic event:

1278-04-07 Friuli M = 5.5

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

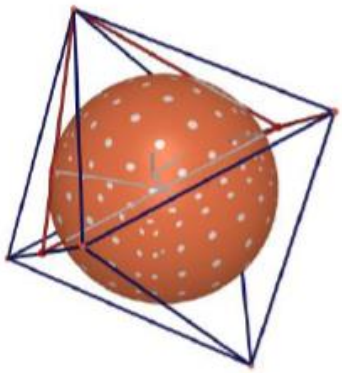


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor \arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\ l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\ l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\ l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\ l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\ dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.14193957152658430892433073219616263267751338681165904468254173 93

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}$ $5^{-1/(3\pi)}$ (e/((2 π C_{MRB})/3+ϕ^2))$^{1/3}$+1)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx 3.1419$$ (real, principal root)

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx -3.1419$$ (real root)

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2} \times \frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8].

Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

4096 = 64^2 , (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$). The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{-1+256\sqrt{2}^{\,8}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^{\,8}\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{-1+256\sqrt{2}^{\,8}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^{\,8}\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

1.61805 (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+\right.$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+\right.$$
$$27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^{\,8}\right)}{2\pi}\right\rfloor\right)\sqrt{x}$$
$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^{\,8}\right)^k}{k!}\right) \text{ for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$

$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^{\,8}-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^{\,8}-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi\, e^{0} \approx 3.1416$ (real, principal root)

$\pi\, e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1\sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty\frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003 \text{ (real, principal root)}$$

$$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003 \text{ (real root)}$$

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\pi \left\lfloor \frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k \left(\frac{8}{\pi^2}-x\right)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)3}}{3\times3}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)3}}{3\times3}}=$$

$$\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\ a^3\right)\left(\sqrt{2}\ d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\frac{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}{3\times 3}}}} =$$

$$\sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor \arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor \arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor \arg(5-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor \arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.1415926535884871624221932509858715278931025189245576170078100613
…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano's Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\left(\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2 \times \frac{2 \cdot \sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi \cdot 0.9991104684}(C \times \mathrm{R} \times 2.33 \cdot 10^{-13})}} \cong 1.61803398 \ldots = \frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1} = 1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}} \approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.6180359123482642354401744088347098542545273508401733563064818107
…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$0.809018\,x^2\,y\,z$ + constant

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\,dx\,dy\,dz = 12.9443\,L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\,dz\,dy\,dx = 6.77761\,R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$ is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

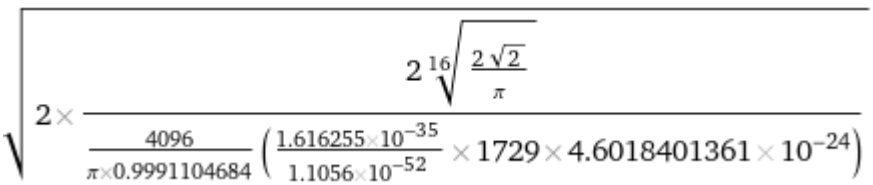
From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and R = $4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...



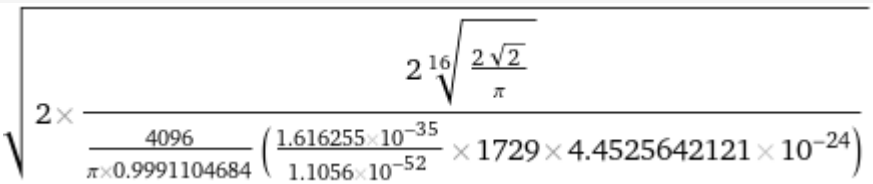
1.6180329973075324915067570166297467464225772608929671407919395903
…

1.6180329973075… result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation



Result

1.64493235210209213048389898370415116887662184165516687791416603 38
…

1.64493235210209213…≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

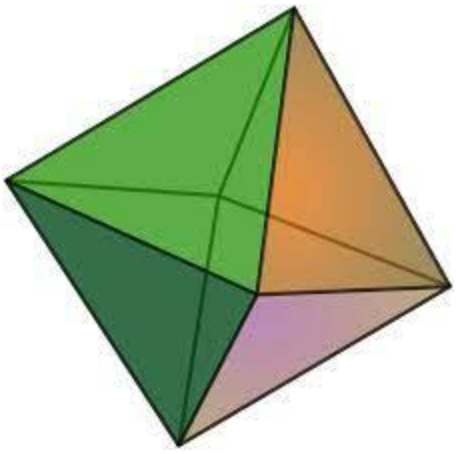
Result

3.14159225731469939399500392316057964697311717816444239557900247 97

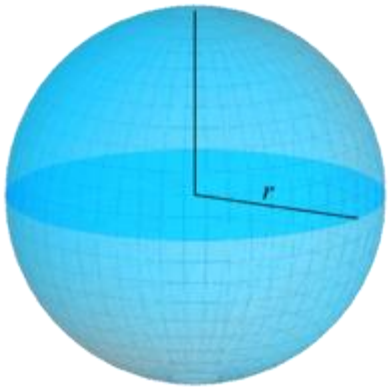
…

3.14159225731469…≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find *a*, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

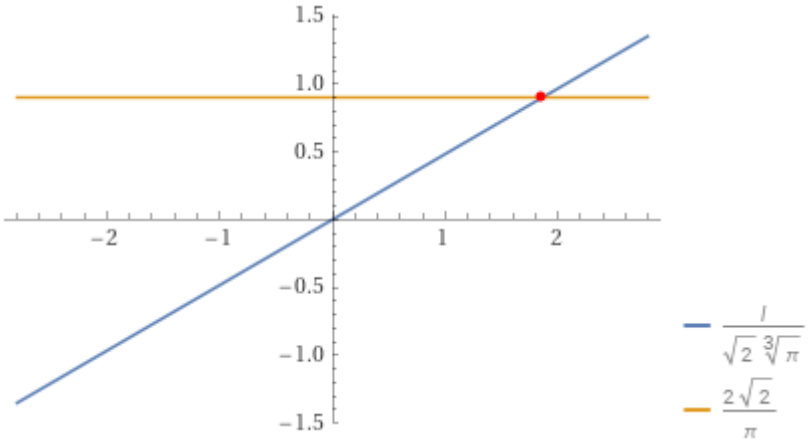
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256x^8 + 95\,744x^7 - 3\,248\,750\,080x^6 - 914\,210\,725\,504x^5 + 15\,498\,355\,554\,921\,184x^4 + 2\,911\,478\,392\,539\,914\,656x^3 - 32\,941\,144\,911\,224\,677\,091\,680x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi =$$
$$\left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

.

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not}\ (z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

$1.64381856858\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256x^8+95\,744x^7-3\,248\,750\,080x^6-914\,210\,725\,504x^5+15\,498\,355\,554\,921\,184x^4+2\,911\,478\,392\,539\,914\,656x^3-32\,941\,144\,911\,224\,677\,091\,680x^2-3\,092\,528\,914\,069\,760\,354\,714\,456x+26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x=1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right)+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

.

$$\sqrt[15]{-\frac{187}{4}+\frac{29\sqrt{5}}{4}+54\sqrt{1093}-\frac{27}{8}\sqrt{10-2\sqrt{5}}-\frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^{0}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

.

$$e^{(2i\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

.

$$e^{(4i\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.0999 + 1.2216\,i$$

.

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\text{^}(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\text{^}(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.$$
$$108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\text{^}(1/15)\Bigg)$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\,e^{\gamma_E\,\phi} \;=\; -\,\frac{\beta_E^{(p)}\,h^2}{\gamma_E}\,e^{-2\,(8-p)\,C+2\,\beta_E^{(p)}\,\phi}$$

$$16\,k'\,e^{-2C} \;=\; \frac{h^2\left(p\;+\;1\;-\;\frac{2\,\beta_E^{(p)}}{\gamma_E}\right)e^{-2\,(8-p)\,C+2\,\beta_E^{(p)}\,\phi}}{(7\;-\;p)}$$

$$(A')^2 \;=\; k\,e^{-2\,A} \;+\; \frac{h^2}{16(p\;+\;1)}\left(7\;-\;p\;+\;\frac{2\,\beta_E^{(p)}}{\gamma_E}\right)\;e^{-2\,(8-p)\,C+2\,\beta_E^{(p)}\,\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\,e^{-\pi\sqrt{18}}$ instead of

$$e^{-2\,(8-p)\,C+2\,\beta_E^{(p)}\,\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning p, C, β_E and ϕ correspond to the exponents of e (i.e. of exp). Thence we obtain for p = 5 and $\beta_E = 1/2$:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while $-6C+\phi$ is equal to $-\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$\exp\left(-\pi\sqrt{18}\right)$

Exact result:

$e^{-3\sqrt{2}\,\pi}$

Decimal approximation:

$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$

$1.6272016\ldots * 10^{-6}$

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi\sum_{j=0}^{\infty}\text{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096} e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625}\,e^{-6C+\phi} = \frac{1}{0.000244140625}\,e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^{k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}} \times \frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

–5.010882647757...

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\,\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\,\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - z_0)^k\,z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\,dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}}-\varphi+1}=1-\cfrac{e^{-\pi}}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-3\pi}}{1+\cfrac{e^{-4\pi}}{1+\ldots}}}}\approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = ϕ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\;. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\;\phi\;e^{-\gamma\,\phi}\right)^2\;. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\;\phi\;e^{-\gamma\,\phi}\right)^2\;.$$

$$\phi = \varphi - \frac{\sqrt{6}}{k},$$

$$a = \frac{b\gamma}{e} < 0, \qquad \gamma = \frac{k}{\sqrt{6}} < 0.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1} = 1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}} \approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V = \frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V = \frac{1}{3}(0.0814845\,b + 1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\,\sqrt{6}}\right)^2\right\} = 0$$

for $b = -\frac{226\,802\,245}{18\,480\,874}$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

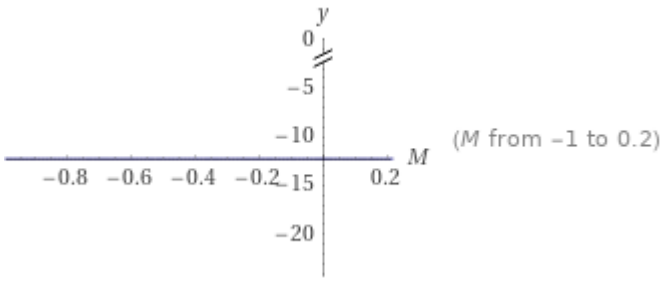
Input interpretation:

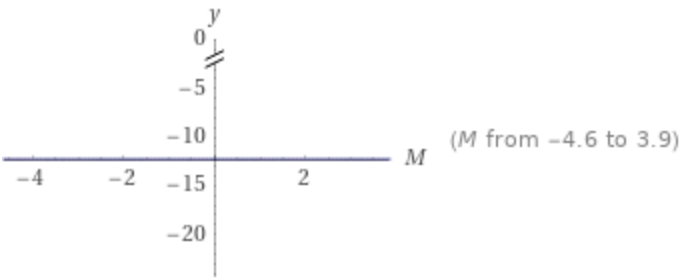
$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:





(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

$$-12.2723$$

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

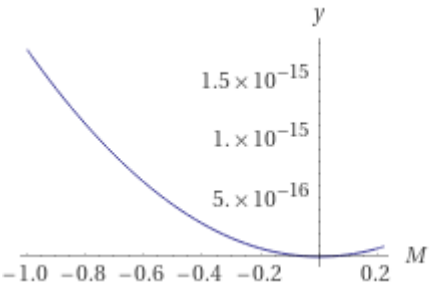
Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

Result:

0

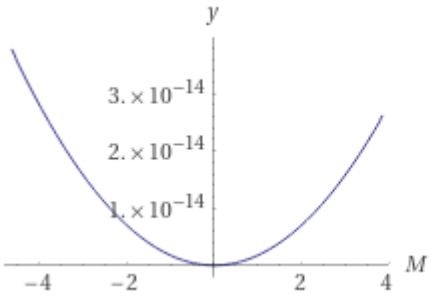
Plots: **(possible mathematical connection with an open string)**



(*M* from −1 to 0.2)

M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O\left(M^{62194}\right)$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^\infty \left(\frac{1}{3} M^2 \left(1 + \frac{18.4084 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4} \right)}{M^2} \right)^2 - 1.75541 \times 10^{-15}\, M^2 \right) dM = 0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3} \left(0.0814845 \times \frac{225.913 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4} \right)}{M^2} + 1 \right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3} \left(0.0814845 \times \frac{225.913 \left(-0.054323\, (-0.5)^2 + 6.58545 \times 10^{-10} \sqrt{(-0.5)^4} \right)}{(-0.5)^2} + 1 \right)^2 \left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots \times 10^{-16}$$

-4.38851344947*10^-16

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times10^{-17}$

7.021621519159*10^{-17}

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

$1.57986484181*10^{-14}$

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 2^2 + 6.58545 \times 10^{-10}\sqrt{2^4}\right)}{2^2} + 1\right)^2 \times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\,\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}\,l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}\,l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_{0}}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\ \hat{}\ (1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\ \sqrt[4]{3}\ e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182...

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

5.729475 * 10^{-35} Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

1.820306 * 10^{61} V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

5.975498*10^{-8} V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

1.042940*10^{27} V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

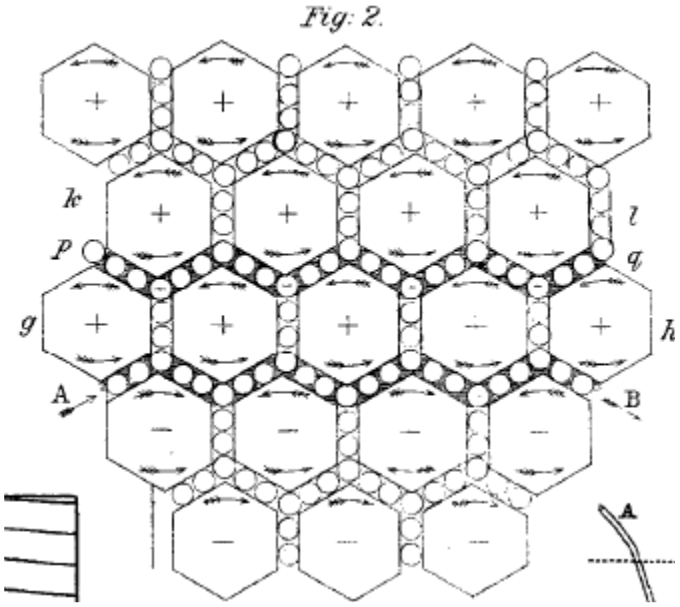
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

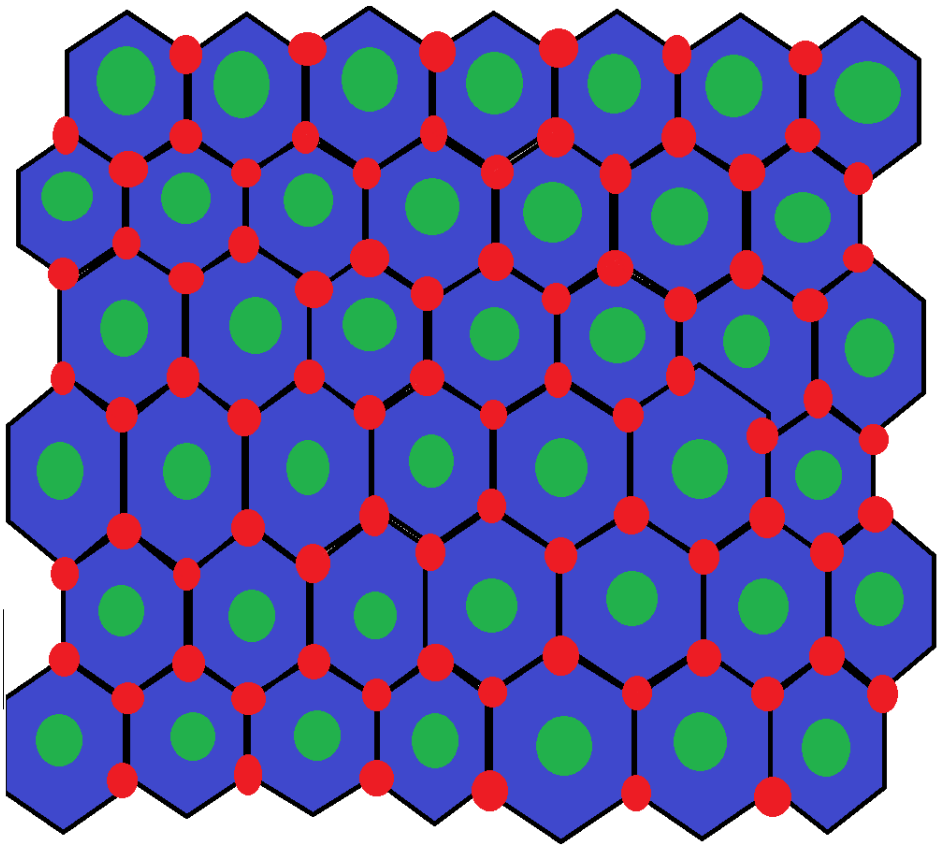
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

An Update on Brane Supersymmetry Breaking - *Jihad Mourad and Augusto Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On some equations concerning the seismology and the calculation relating to solar eclipses. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper, we analyze some equations concerning the seismology and the calculation relating to solar eclipses. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology, Gravitational Waves and String Theory

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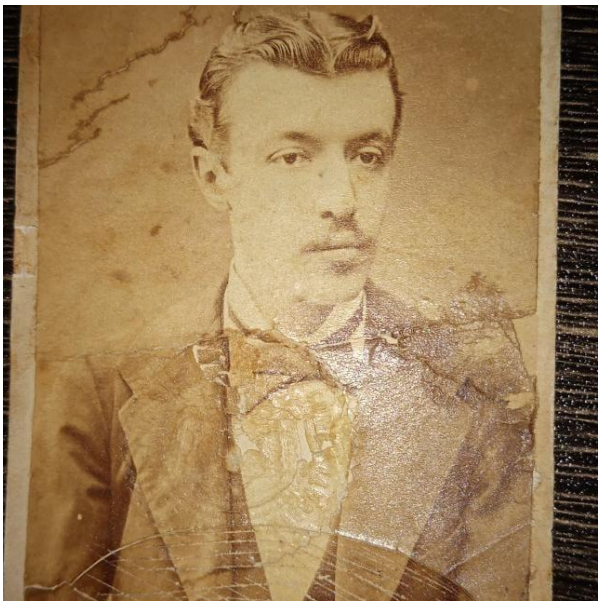
Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico



(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

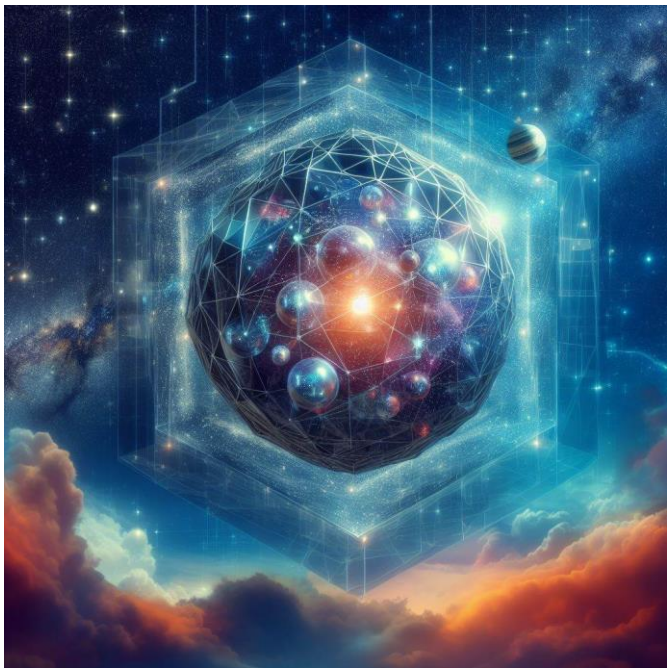
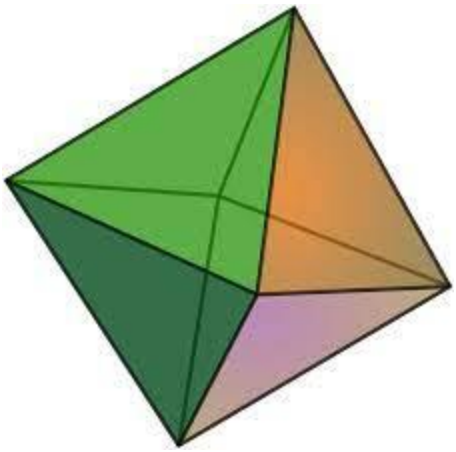
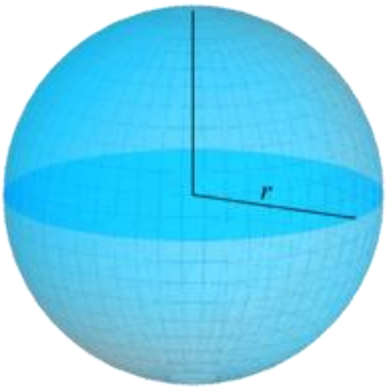


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\pi x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$l = 0, \quad x = 0$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt{2}\ \sqrt[3]{\pi}\right) = \log_{\sqrt{2}\ \sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\ \sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\ \pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

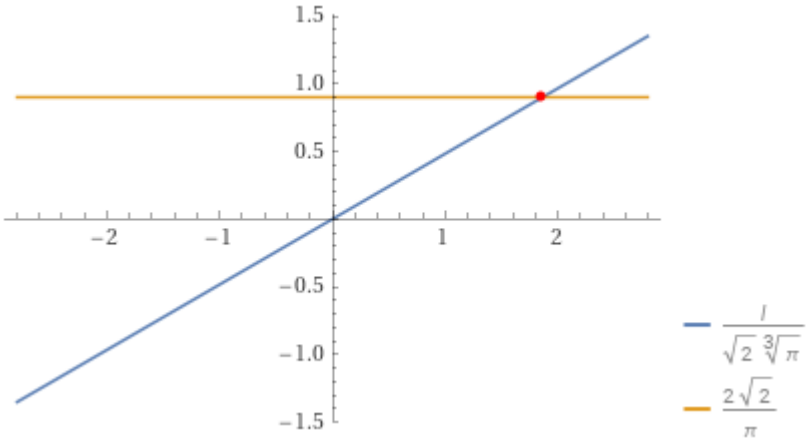
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\ \pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\ \sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

Plot



Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$

Introduction

In this work, we will highlight the strong connection that exists between solar eclipses and earthquakes. Starting from the solar eclipse of 17.06.1890, we will predict through certain calculations, the eclipse that occurred on 21.08.2017, the date on which the earthquake also occurred in Casamicciola d'Ischia (Na). The same calculations were carried out by the eminent scientist and geophysicist Prof. Giulio Grablovitz, predicting the earthquake of 21.08.2017 127 years earlier. The great seismologist, unlike the writer, did not have today's technology. The calculations were then performed manually.

https://cosmo2050.com/2023/04/21/le-eclissi-nellantichita-larte-di-predire-il-futuro/

The Saros Cycle:

To try to anticipate such important events as solar eclipses, various cultures around the world have independently tried to understand if there was a law that linked their cyclicality. It was discovered that the eclipses appeared to occur following an 18-year cycle (to be precise, 223 synodic months, i.e. **18 years, 11 days, 8 hours and 42 minutes**). Thus began to appear written documents from the Babylonians and Assyrians, from ancient Mesopotamia to modern Iraq, and other oral traditions in which the **18-year cycle** was mentioned. In fact, it was also used for ceremonial purposes by the Torres Strait Islanders, in what is now Australia. This **18-year cycle** is known as the Saros cycle and can persist without fail for over a thousand years. The word, of Babylonian origin, (šāru) means 3600 (years) from the Greek “saro” (σαρῶ) which means “to sweep”. The Saros cycle is the time it takes for the Sun-Earth-Moon system to return to almost exactly the same configuration. So, a lunar eclipse will repeat in exactly the same pattern every 18 years. The problem is that it probably won't be visible from the same place on Earth. This means that, worldwide, there is a visible total solar eclipse somewhere approximately every 18 months. During a saros, 29 lunar and 41 solar eclipses occur. After three Saros, typically, the Earth will have completed a whole number of rotations and the eclipses will occur again in the same place. This period, lasting 19,756 days (about 54 years), is called exeligmos (“turning of the wheel” in Greek). It is possible for multiple repeating Saros sequences to overlap simultaneously. For example, the total solar eclipse in 2028, visible from Sydney, is part of a completely different Saros sequence than this year's eclipse. After about a thousand years, when one long-term Saros sequence ends, another will begin at slightly different times. Is it therefore true that our ancestors were able to calculate the period in which the eclipses would have occurred? As for lunar ones, the answer is yes, and perhaps also for some types, if not all types of solar eclipses.

We also highlight the fact that one eclipse in a biannual series of solar eclipses repeats approximately every 177 days and 4 hours (one half year) at alternating nodes of the Moon's orbit.

(https://it.wikipedia.org/wiki/Eclissi_solare_del_2_october_1959)

Now let's start from the solar eclipse which occurred on 17.06.1890. and to it we add the cycle of 18 years, 11 days, 8 hours and 42 minutes. We'll have:

June 17, 1890+ 18 years 11 days 8 hours 42 minutes

Input interpretation

Tuesday, June 17, 1890 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am CET | Sunday, June 28, 1908

Time difference from now (9:05:52 am)

116 years 1 day 23 minutes 53 seconds ago

On 28.06.1908 we have news of two earthquakes of the VI Mercalli with epicenters in southern Emilia and Lower Tyrrhenian. On 30.06.1908, we have news of a VII Mercalli earthquake with an epicenter at sea (Aeolian Islands - Messina)

We obtained a first date: June 28, 1908, which corresponds to a solar eclipse. The solar eclipse of June 28, 1908 is an astronomical event that took place on the aforementioned day around 4.29 pm UTC (Coordinated Universal Time or Civil Time).

Now let's add to this date, i.e. Sunday 28 June 1908 8:42 am CET (Central European time), 39512 days = 2*19756 days = approximately 2*54 years = approximately 108 years:

8:42 am CET | Sunday, June 28, 1908 + 39512 days

Input interpretation

Sunday, June 28, 1908 at 8:42 am CEST + 39512 days

Result

8:42 am CEST | Thursday, September 1, 2016

The result of this last calculation is the date 1 September 2016, the day on which a **solar eclipse** occurred which took place in.

Just over a week after the start of the sequence with the magnitude 6.0 earthquake which occurred at 03:36 Italian time on **24 August**, the National Seismic Network of the National Institute of Geophysics and Volcanology (INGV) has located a total of over 3400 events: 147 earthquakes with a magnitude between 3.0 and 4.0; 13 localized ones with a magnitude between 4.0 and 5.0 and one with a magnitude greater than 5.0 (that of magnitude 5.4 (Mw 5.3) on 24 August at 04.33 Italian time in the Norcia (PG) area. From 6.00 pm on 31.08.2016 to 06.49 on 01.09.2016 (time of the last update) there were 7 events with a magnitude greater than or equal to 3.0, reported in the table below. The strongest earthquake, of magnitude M 3.7, was located at 8.12 pm Italian time. of August 31st in the province of Ascoli Piceno, near Arquata del Tronto.

Data e Ora (UTC)	Magnitudo	Provincia/Zona	Profondità	Latitudine	Longitudine
2016-09-01 06:49:34	3.1	Macerata	10	42.86	13.23
2016-09-01 03:53:03	3.6	Rieti	10	42.62	13.32
2016-09-01 01:55:52	3.1	Macerata	15	42.85	13.18
2016-08-31 22:14:09	3.5	Ascoli Piceno	11	42.75	13.24
2016-08-31 21:42:52	3.5	Perugia	11	42.78	13.17
2016-08-31 20:08:02	3.5	Perugia	11	42.83	13.14
2016-08-31 18:12:52	3.7	Ascoli Piceno	9	42.83	13.26

If on this date 8:42 am CEST | Thursday, September 1, 2016, remembering that an eclipse in a biannual series of solar eclipses repeats approximately every **177 days and 4 hours**, we add 354 days 8 hours (= 2*177 days and 4 hours). From this calculation we obtain:

8:42 am CEST | Thursday, September 1, 2016+354 days 8 hours

Input interpretation

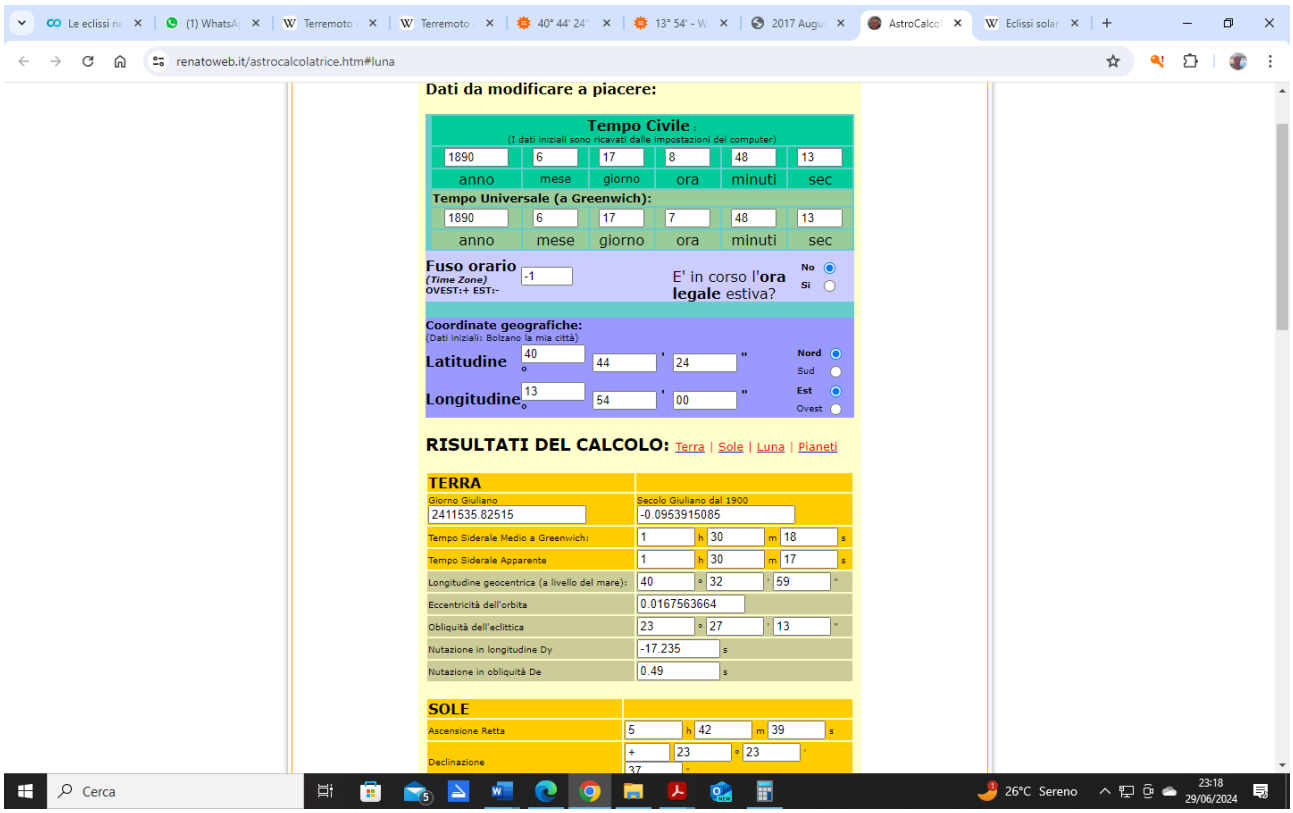
Thursday, September 1, 2016 at 8:42 am CEST + 354 days 8 hours

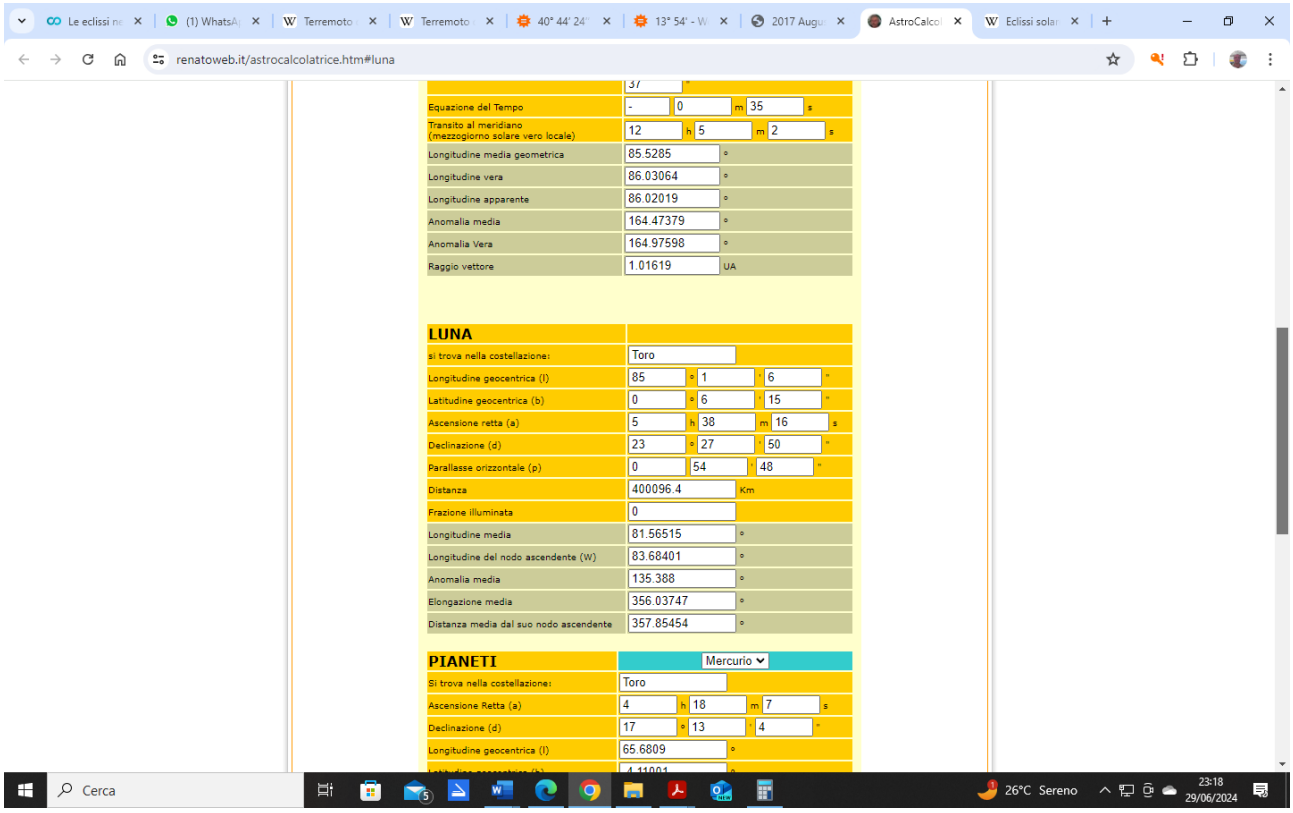
Result

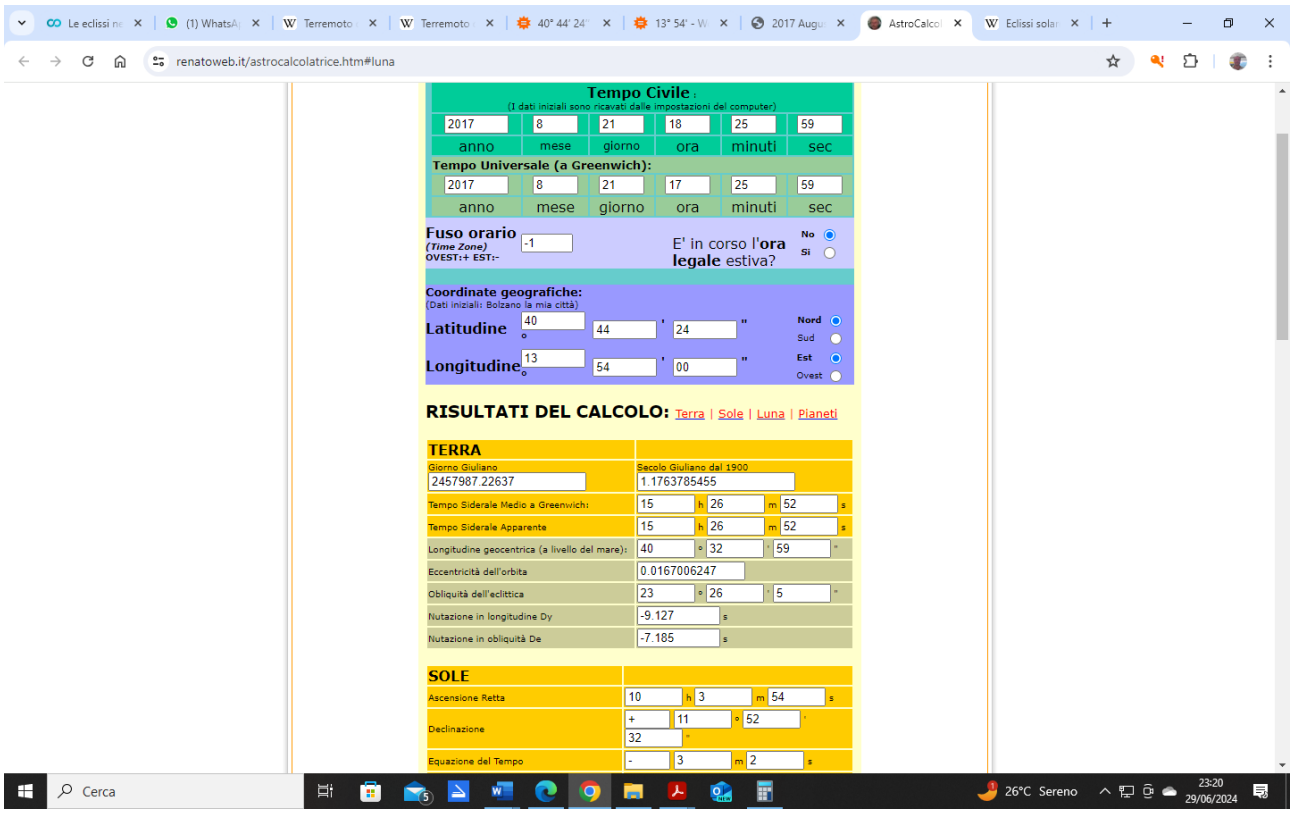
4:42 pm CEST | Monday, August 21, 2017

We get 21 August 2017, which is the date of the solar eclipse that took place at 18:26 UTC (Coordinated Universal Time or Civil Time), and it is also the date of the earthquake that occurred in Casamicciola d'Ischia: 21 August 2017. Were these the calculations that made the eminent scientist predict, 127 years in advance, the Casamicciola d'Ischia earthquake of 21 August 2017? We firmly believe that these are the calculations and we will test them on other data in our possession to validate the Grablovitz theory.

Casamicciola 40° 44’ 24” N 13° 54’ E


renatoweb.it/astrocalcolatrice.htm#luna
Dati da modificare a piacere:
Tempo Civile :
(I dati iniziali sono ricavati dalle impostazioni del computer)
1890 6 17 8 48 13
anno mese giorno ora minuti sec
Tempo Universale (a Greenwich):
1890 6 17 7 48 13
anno mese giorno ora minuti sec
Fuso orario (Time Zone) OVEST:+ EST:-
-1
E' in corso l'ora legale estiva?
No
Si
Coordinate geografiche:
(Dati iniziali: Bolzano la mia città)
Latitudine 40 ° 44 ' 24 "
Nord
Sud
Longitudine 13 ° 54 ' 00 "
Est
Ovest
RISULTATI DEL CALCOLO: Terra | Sole | Luna | Pianeti
TERRA
Giorno Giuliano
2411535.82515
Secolo Giuliano dal 1900
-0.0953915085
Tempo Siderale Medio a Greenwich: 1 h 30 m 18 s
Tempo Siderale Apparente 1 h 30 m 17 s
Longitudine geocentrica (a livello del mare): 40 ° 32 ' 59 "
Eccentricità dell'orbita 0.0167563664
Obliquità dell'eclittica 23 ° 27 ' 13 "
Nutazione in longitudine Dy -17.235 s
Nutazione in obliquità De 0.49 s
SOLE
Ascensione Retta 5 h 42 m 39 s
Declinazione + 23 ° 23 '
Cerca
26°C Sereno
23:18
29/06/2024


renatoweb.it/astrocalcolatrice.htm#luna
Equazione del Tempo - 0 m 35 s
Transito al meridiano (mezzogiorno solare vero locale) 12 h 5 m 2 s
Longitudine media geometrica 85.5285 °
Longitudine vera 86.03064 °
Longitudine apparente 86.02019 °
Anomalia media 164.47379 °
Anomalia Vera 164.97598 °
Raggio vettore 1.01619 UA
LUNA
si trova nella costellazione: Toro
Longitudine geocentrica (l) 85 ° 1 ' 6 "
Latitudine geocentrica (b) 0 ° 6 ' 15 "
Ascensione retta (a) 5 h 38 m 16 s
Declinazione (d) 23 ° 27 ' 50 "
Parallasse orizzontale (p) 0 54 ' 48 "
Distanza 400096.4 Km
Frazione illuminata 0
Longitudine media 81.56515 °
Longitudine del nodo ascendente (W) 83.68401 °
Anomalia media 135.388 °
Elongazione media 356.03747 °
Distanza media dal suo nodo ascendente 357.85454 °
PIANETI Mercurio
Si trova nella costellazione: Toro
Ascensione Retta (a) 4 h 18 m 7 s
Declinazione (d) 17 ° 13 ' 4 "
Longitudine geocentrica (l) 65.6809 °
Cerca
26°C Sereno
23:18
29/06/2024



Tempo Civile
(I dati iniziali sono ricavati dalle impostazioni del computer)

anno	mese	giorno	ora	minuti	sec
2017	8	21	18	25	59

Tempo Universale (a Greenwich):

anno	mese	giorno	ora	minuti	sec
2017	8	21	17	25	59

Fuso orario (Time Zone) OVEST:+ EST:- : -1

E' in corso l'**ora legale** estiva? No / Si

Coordinate geografiche:
(Dati iniziali: Bolzano la mia città)

Latitudine 40° 44' 24" Nord / Sud

Longitudine 13° 54' 00" Est / Ovest

RISULTATI DEL CALCOLO: Terra | Sole | Luna | Pianeti

TERRA

Giorno Giuliano: 2457987.22637	Secolo Giuliano dal 1900: 1.1763785455
Tempo Siderale Medio a Greenwich:	15 h 26 m 52 s
Tempo Siderale Apparente	15 h 26 m 52 s
Longitudine geocentrica (a livello del mare):	40 ° 32 ' 59 "
Eccentricità dell'orbita	0.0167006247
Obliquità dell'eclittica	23 ° 26 ' 5 "
Nutazione in longitudine Dy	-9.127 s
Nutazione in obliquità De	-7.185 s

SOLE

Ascensione Retta	10 h 3 m 54 s
Declinazione	+ 11 ° 52 ' 32 "
Equazione del Tempo	- 3 m 2 s

Transito al meridiano (mezzogiorno solare vero locale)	12 h 7 m 29 s
Longitudine media geometrica	150.22949 °
Longitudine vera	148.84759 °
Longitudine apparente	148.83908 °
Anomalia media	226.98784 °
Anomalia Vera	225.60581 °
Raggio vettore	1.01155 UA

LUNA

si trova nella costellazione:	Leone
Longitudine geocentrica (l)	148 ° 14 ' 54 "
Latitudine geocentrica (b)	0 ° 22 ' 19 "
Ascensione retta (a)	10 h 2 m 10 s
Declinazione (d)	12 ° 25 ' 46 "
Parallasse orizzontale (p)	0 58 57 "
Distanza	371944.2 Km
Frazione illuminata	0
Longitudine media	143.64873 °
Longitudine del nodo ascendente (W)	143.903 °
Anomalia media	62.61008 °
Elongazione media	353.42119 °
Distanza media dal suo nodo ascendente	359.7262 °

PIANETI Mercurio

Si trova nella costellazione:	Leone
Ascensione Retta (a)	10 h 32 m 27 s
Declinazione (d)	4 ° 7 ' 19 "
Longitudine geocentrica (l)	158.22599 °
Latitudine geocentrica (b)	-4.69892 °
Distanza dalla Terra (D)	0.62004561 UA

We obtain:

(23 hours 27 minutes 50 seconds) - (12 hours 25 minutes 46 seconds)

Input interpretation

23 hours 27 minutes 50 seconds – 12 hours 25 minutes 46 seconds

Results

11 hours 2 minutes 4 seconds

11.03 hours

---

39 724 seconds

662.1 minutes

Unit conversion

0.4598 days

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.191×10^{10} km (kilometers)

1.191×10^{13} meters

80 au (astronomical units)

7.4 billion miles

Frequency ν from $\nu = 1/T$:

2.5×10^{-5} Hz (hertz)

From

39724 seconds

we obtain:

1/6(39724/4096)

Input

$$\frac{1}{6} \times \frac{39724}{4096}$$

Exact result

$$\frac{9931}{6144}$$

Decimal approximation

1.616373697916666666666666666666666666666666666666666666666666666666666666666

…

Repeating decimal

$1.616373697916\overline{6}$ (period 1)

1.616373697916… result that is a good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

From

(23 hours 27 minutes 50 seconds)

Input interpretation

23 hours 27 minutes 50 seconds

Results

23.46 hours

---

84 470 seconds

1408 minutes

Unit conversion

0.9777 days

Offsets from current time

23 hours 27 minutes 50 seconds from now	11:19:42 pm CEST | Sunday, June 30, 2024
23 hours 27 minutes 50 seconds before now	12:24:02 am CEST | Saturday, June 29, 2024

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

2.532×10^{10} km (kilometers)

2.532×10^{13} meters

169 au (astronomical units)

15.74 billion miles

Frequency ν from $\nu = 1/T$:

1.2×10^{-5} Hz (hertz)

From

84470 seconds

we obtain:

(1/(2Pi))(84470/8192)

Input

$$\frac{1}{2\pi} \times \frac{84470}{8192}$$

Result

$$\frac{42235}{8192\pi}$$

Decimal approximation

1.641091069698779176318067809091343769659522250451215359584406805 7

…

1.64109106969….≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{42235}{8192\pi}$ is a transcendental number

Alternative representations

$$\frac{84470}{8192(2\pi)} = \frac{84470}{8192(360°)}$$

$$\frac{84470}{8192(2\pi)} = \frac{84470}{8192(-2i\log(-1))}$$

$$\frac{84470}{8192(2\pi)} = \frac{84470}{8192\left(2\cos^{-1}(-1)\right)}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\frac{84470}{8192(2\pi)} = \frac{42235}{32768\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\frac{84470}{8192(2\pi)} = \frac{42235}{32768\sum_{k=0}^{\infty}\frac{(-1)^{1+k}\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}}$$

$$\frac{84470}{8192\,(2\,\pi)} = \frac{42235}{8192\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)}$$

Integral representations

$$\frac{84470}{8192\,(2\,\pi)} = \frac{42235}{32768\int_0^1\sqrt{1-t^2}\;dt}$$

$$\frac{84470}{8192\,(2\,\pi)} = \frac{42235}{16384\int_0^{\infty}\frac{1}{1+t^2}\,dt}$$

$$\frac{84470}{8192\,(2\,\pi)} = \frac{42235}{16384\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt}$$

And:

(12 hours 25 minutes 46 seconds)

Input interpretation

12 hours 25 minutes 46 seconds

Results

12.43 hours

44746 seconds

745.8 minutes

Unit conversion

0.5179 days

Offsets from current time

12 hours 25 minutes 46 seconds from now	12:22:29 pm CEST | Sunday, June 30, 2024
12 hours 25 minutes 46 seconds before now	11:30:57 am CEST | Saturday, June 29, 2024

Interpretations

time

Corresponding quantities

Distance x traveled by light in a vacuum from $x = ct$:

1.341×10^{10} km (kilometers)

1.341×10^{13} meters

90 au (astronomical units)

8.335 billion miles

Frequency ν from $\nu = 1/T$:

2.2×10^{-5} Hz (hertz)

Related Queries:

From

44 746 seconds

we obtain:

2((1/6)(44746/4096))-2

Input

$$2\left(\frac{1}{6}\times\frac{44746}{4096}\right)-2$$

Exact result

$$\frac{10085}{6144}$$

Decimal approximation

1.641438802083333333333

From: "**Sull'Eclisse del 17 giugno 1890, osservato ad Ischia**" – Nota del *Prof. Giulio Grablovitz*

Sull'Eclisse del 17 giugno 1890, osservato ad Ischia

Nota del Prof. **G. GRABLOVITZ** (1).

L'eclisse solare del 17 giugno 1890 si presentò ad Ischia nelle migliori condizioni atmosferiche desiderabili; non una nube ingombrava il cielo e soltanto qualche rado velo si stendeva basso all'orizzonte dalla parte del continente. Spirava una leggiera tramontana che soltanto nel pomeriggio volse a NNW acquistando un po' di forza, cosa che di ordinario nelle belle giornate avviene qui intorno alle 10 del mattino, deprimendo più o meno la curva ascendente del termometro. Ora il 17 tale depressione è stata più marcata degli altri giorni, malgrado la mancanza del consueto maestrale moderato. Epperò, tenuto conto di queste eccezionali condizioni di calma e purezza dell'atmosfera, ritengo che i fenomeni termici osservati negli strumenti durante l'eclisse debbano ascriversi pressochè intieramente alla sottrazione di raggi solari dovuta all'interposizione della luna.

Il primo contatto, calcolato per le $8^h\ 48^m\ 7^s$ ant. in tempo medio di Roma per questa torre meteorologica ed osservato mediante affumicamento di un cannocchiale dell'ingrandimento lineare di 1 a 12, fu avvertito a $8^h\ 48^m\ 13^s$; alla fine del fenomeno il contatto dei due dischi si rese insensibile a $11^h\ 53^m\ 40^s$, mentre il calcolo dava $11^h\ 53^m\ 48^s$.

L'andamento della temperatura dell'aria, quale risulta dal termometro registratore, non offriva fino alle 9 ant. nulla d'anormale; da un minimo relativo di 16° al levar del sole era salita nelle prime ore con rapidità ed alle 9 ant. toccava il 19°.7; da quello istante scese fino alle 10 $^1/_2$ quando toccò 19°, per poi risalire alquanto rapidamente ed arrivare al mezzodì a 21°.2. La discesa di 0°.7 nell'incremento dell'eclisse non sarebbe molto significante, senonchè è duopo considerare che in circostanze ordinarie si sarebbe avuto in quelle ore un deciso aumento; ed infatti se si segue a stima la tendenza della curva, l'inflessione tra le 9 ed il mezzodì riesce pronunciatissima e presenta un andamento molto regolare di discesa e salita con una depressione massima di 1°.5 rispetto alla temperatura presumibile, poco dopo l'istante della massima fase.

Molto più pronunciato fu l'effetto riscontrato mediante concentrazione artificiale del calore solare; a tale intento impiegai il termometro registratore Richard per temperature alte, che aveva tolto pochi giorni addietro dalla termale, per ripararne il motore, approfittando della corrente stagione balneare, in cui ad ogni modo le registrazioni riuscirebbero alterate dall'estrazione abbondante d'acqua che si fa per la cura.

(1) Il prof. GRABLOVITZ aveva calcolato le circostanze dell'eclisse per 9 punti risultanti dall'incontro dei paralleli di 37°, 42° e 47° col meridiano di Roma e coi due meridiani equidistanti dal medesimo di 5°, e costruito un grafico rappresentante le ore del principio e della fine e la grandezza della massima fase; ma il lavoro giunse troppo tardi per la pubblicazione.

Ricoperto il bulbo metallico d'un doppio strato di carta azzurra da involto, lo difesi dall'aria esterna mediante un tubo di vetro otturato alle estremità con bambagia; benchè il motore non funzionasse regolarmente, potei assicurarmi, coll'aiuto di dirette letture, dell'andamento della temperatura a brevi intervalli; montato l'apparecchio prima delle 7 ant. l'indice abbandonò tosto sotto l'azione dei raggi solari la temperatura primitiva di 19°.9 (corretta dell'errore strumentale);

alle 8 ant. segnava	33°.8
alle 8 $^3/_4$ (primo contatto) toccava un massimo di	41°.8
alle 9 era scesa a	41°.4
alle 9 $^1/_2$ era scesa a	32°.7
alle 10 era scesa a	27°.9
alle 10 $^1/_4$ (massima fase) toccava un minimo di	27°.3

indi salì, dapprima lentamente, poi rapidamente, per toccare alla fine dell'eclisse ($11^h\,54^m$) 50°.3
e dopo il mezzodì un massimo di 52°.0

Interessante è pure l'impronta sulla cartina dell'eliofanometro; nel restante della traccia di tutta quella giornata non si osserva che la diminuzione prodotta quasi ogni mattina nell'estate alle 6 dai vapori sovrastanti al Vesuvio, ed un affievolimento prodotto da poche nubi alla sera.

Durante l'eclisse, come si scorge dall'annesso fac-simile, fig. 3 (Tav. CCL), l'ustione della cartina incominciò a difettare dalla parte superiore, corrispondente per proiezione alla porzione eclissata del sole alle 9 1/2 ant.; si sospese intieramente a $9^h\,54^m$ ant ed intaccò nuovamente la cartina a $10^h\,48^m$, per riprendere quasi l'aspetto normale alle 11 1/2 ant., tutte ore in tempo vero locale.

La massima fase era calcolata per le $10^h\,15^m\,52^s$ di tempo medio di Roma, pari a $10^h\,21^m\,7^s$ di tempo vero locale, istante intermedio tra $9^h\,54^m$ e $10^h\,48^m$; in questi due istanti la fase dell'eclisse era = 0.60 del diametro, equivalente in area alla metà del disco solare. Nella massima fase, in cui fu accertato il perfetto combaciamento dell'immagine proiettata dal cannocchiale con quella calcolata, la porzione eclissata del diametro = 0.732 corrispondeva a quasi 2/3 dell'area.

Equazioni di condizione fra i tempi dei contatti osservati a Padova nell'eclisse solare del 16 giugno 1890 e le correzioni delle coordinate e dei semidiametri del Sole e della Luna. — Nota del dott. G. CISCATO.

Dalla *Connaissance des temps* pel 1890 e, per verificazione, dal *Nautical Almanac* di Londra, ho ricavato le coordinate equatoriali geocentriche, il semidiametro e la parallasse orizzontale equatoriale del Sole e della Luna per due tempi, diversi fra loro di mezzo

minuto e comprendenti fra loro i tempi osservati dai tre osservatori pel principio dell'eclisse, e per altri due tempi, pure diversi di mezzo minuto, fra i quali sono compresi i tre tempi osservati della fine.

Le posizioni del Sole date dalle due effemeridi essendo calcolate sulle tavole del Le Verrier ed essendo eguale in ambedue il valore del semidiametro alla distanza media della terra, era evidente che i risultati relativi al Sole dovessero riuscire identici come avvenne infatti. Una piccola differenza di $0'',01$ nella parallasse ha la sua ragione in questo, che nell'effemeride di Parigi la parallasse del Sole è assunta $= 8'',86$, mentre il valore adottato da quella di Greenwich $= 8'',848$.

Per quanto riguarda la Luna, le due effemeridi danno risultati coincidenti pei valori della parallasse orizzontale equatoriale e del semidiametro, giacchè ambedue le effemeridi traggono questi elementi dalle Tavole di Hansen. Invece le ascensioni rette e le declinazioni date dal *Nautical Almanac* differiscono da quelle della *Connaissance* per questo, che mentre la *Connaissance* dà puramente le coordinate dedotte dalle Tavole di Hansen, il *Nautical Almanac* le porge corrette delle piccole quantità adottate dal Newcomb per la compilazione del *Nautical Almanac* di Washington. Applicando alle coordinate dedotte dalla *Connaissance des temps* e date nella seguente tabella le correzioni di Newcomb date da quella effemeride alle pagine 700 e 701, ho ottenuto identicamente le coordinate del *Nautical Almanac*.

Tempo medio di Padova	*Luna*				*Sole*			
	α	δ	ρ	*parallasse*	A	D	R	*parallasse*
$20^h\ 55^m\ 30^s$	$5^h\ 38^m\ 59^s,43$	$+\ 230°\ 29'\ 9'',4$	$14'\ 57'',3$	$54'\ 47'',56$	$5^h\ 42^m\ 42^s,35$	$+\ 230°\ 23'\ 38'',8$	$15'\ 46'',49$	$8'',72$
20 56 0	5 39 0,53	23 . 29 . 11 ,4			5 42 42,43	23 . 23 . 38 ,9		
23 45 0	5 45 12,58	23 . 39 . 45 ,0	14 . 56 ,5	54 . 45 ,10	5 43 11,72	23 . 23 . 50 ,4		
23 45 30	5 45 13,68	23 . 39 . 46 ,8			5 43 11,80	23 . 23 . 50 ,9		

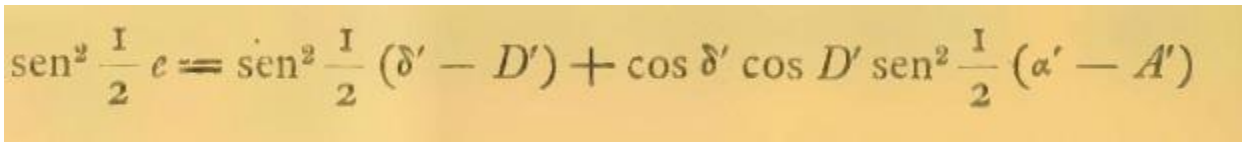
Coi dati di questa tabella ho calcolato la parallasse in ascensione retta, declinazione e semidiametro servendomi di formole differenziali pel Sole e di formole finite e rigorose per la Luna. Ne ottenni la seguente tabella:

Tempo medio di Padova	*Luna*			*Sole*			$\alpha' - A$	$\delta' - D'$
	α'	δ'	ρ'	A'	D'	R'		
$20^h\ 55^m\ 30^s$	85°.15'. 1'',11	$+\ 23°\ 3'\ 59'',6$	15'. 7'',90	85°.40'.40'',08	23°.23'.34'',8	$15'\ 46'',52$	$-\ 25'\ 38'',97$	$-\ 19'\ 35'',2$
20 56 0	85 . 15 . 13 ,87	23 . 4 . 2 ,7	15 . 7 ,91	85 . 40 . 41 ,27	23 . 23 . 34 ,9		− 25 . 27 ,40	19 . 32 ,2
23 45 0	86 . 21 . 24 ,89	23 . 19 . 19 ,2	15 . 9 ,91	85 . 47 . 56 ,25	23 . 23 . 47 ,6	15 . 46 ,53	+ 33 . 28 ,64	4 . 28 ,4
23 45 30	86 . 21 . 36 ,02	23 . 19 . 21 ,1	15 . 9 ,92	85 . 47 . 57 ,44	23 . 22 . 47 ,7		+ 33 . 38 ,58	4 . 26 ,6

Dalla formola

$$\operatorname{sen}^2 \frac{1}{2} e = \operatorname{sen}^2 \frac{1}{2} (\delta' - D') + \cos \delta' \cos D' \operatorname{sen}^2 \frac{1}{2} (\alpha' - A')$$

We analyze the following equation:



sin^2(1/2(4’ 28”)) + cos(23° 3’) cos(23° 23’) sin^2(1/2(33’ 28”))

Input interpretation

$$\sin^2\left(\frac{1}{2}(4\text{ arcminutes}\quad 28\text{ arcseconds})\right) + \cos(23\text{ degrees}\quad 3\text{ arcminutes})$$
$$\cos(23\text{ degrees}\quad 23\text{ arcminutes})\sin^2\left(\frac{1}{2}(33\text{ arcminutes}\quad 28\text{ arcseconds})\right)$$

Result

2.043×10^{-5}

$2.043*10^{-5}$

That is:

sin^2((67 π)/324000) + sin^2((251 π)/162000) cos((461 π)/3600) cos((1403 π)/10800)

Input

$$\sin^2\left(\frac{67\,\pi}{324\,000}\right) + \sin^2\left(\frac{251\,\pi}{162\,000}\right)\cos\left(\frac{461\,\pi}{3600}\right)\cos\left(\frac{1403\,\pi}{10\,800}\right)$$

Decimal approximation

0.000020432639118981731541012547278619449375252926347600380764 3287

…

0.00002043263911….

From which, after some calculations:

1/12*1/(sin^2((67 π)/324000) + sin^2((251 π)/162000) cos((461 π)/3600) cos((1403 π)/10800))+18-2/5

Input

$$\frac{1}{12} \times \frac{1}{\sin^2\left(\frac{67\pi}{324\,000}\right) + \sin^2\left(\frac{251\pi}{162\,000}\right)\cos\left(\frac{461\pi}{3600}\right)\cos\left(\frac{1403\pi}{10\,800}\right)} + 18 - \frac{2}{5}$$

Decimal approximation

4096.041989215061425347636404716204466236396689716188373646707027 7

…

4096.041989215…≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

27*sqrt(1/12*1/(sin^2((67 π)/324000) + sin^2((251 π)/162000) cos((461 π)/3600) cos((1403 π)/10800))+18-2/5)+1

Input

$$27\sqrt{\frac{1}{12}\times\frac{1}{\sin^2\left(\frac{67\pi}{324\,000}\right)+\sin^2\left(\frac{251\pi}{162000}\right)\cos\left(\frac{461\pi}{3600}\right)\cos\left(\frac{1403\pi}{10\,800}\right)}+18-\frac{2}{5}}+1$$

Decimal approximation

1729.008857077352997639306501770530710494659134181285410179835580 3

…

1729.0088570773….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement

of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(1729.0088570773)^1/15+(MRB const)^(1-1/(4π)+π)

Input interpretation

$\sqrt[15]{1729.0088570773} + C_{\text{MRB}}^{1-1/(4\pi)+\pi}$

C_{MRB} is the MRB constant

Result

1.64493858550924…

1.6449385855….≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Now, we analyze the following equation:

$$\rho' + R' - e = \frac{\operatorname{sen}(\delta' - D')}{\operatorname{sen} e} d(\delta' - D') + \cos\delta' \cos D' \frac{\operatorname{sen}(\alpha' - A')}{\operatorname{sen} e} d(\alpha' - A') - d(\rho' + R')$$

(sin(-19° 34’))/(sin(e))*d*(-19° 34’)+cos(23° 4’) cos(23° 23’)*(sin(-25’ 36’’)

Input interpretation

$$\frac{\sin(-19 \text{ degrees } 34 \text{ arcminutes})}{\sin(e)}\, d\,(-19 \text{ degrees } 34 \text{ arcminutes}) + \cos(23 \text{ degrees } 4 \text{ arcminutes})\cos(23 \text{ degrees } 23 \text{ arcminutes})\sin(-25 \text{ arcminutes } 36 \text{ arcseconds})$$

Result

$$d\,851.3' \text{ (arcminutes)} - \sin\left(\frac{61\pi}{27000}\right)\cos\left(\frac{173\pi}{1350}\right)\cos\left(\frac{1403\pi}{10800}\right)$$

i.e.

d 851.3' - sin((61 π)/27000) cos((173 π)/1350) cos((1403 π)/10800)

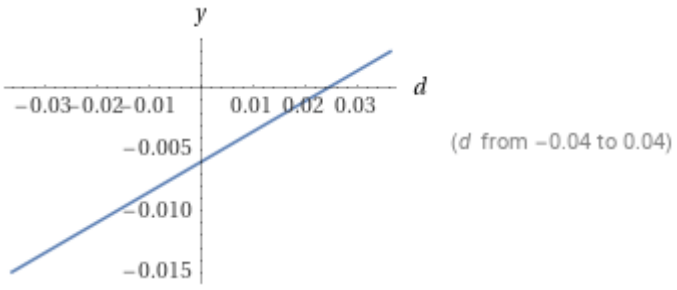
Input

$$d\left(851.3 \times \frac{\pi}{10800}\right) - \sin\left(\frac{61\pi}{27000}\right)\cos\left(\frac{173\pi}{1350}\right)\cos\left(\frac{1403\pi}{10800}\right)$$

Result

$$0.24763\,d - \sin\left(\frac{61\pi}{27000}\right)\cos\left(\frac{173\pi}{1350}\right)\cos\left(\frac{1403\pi}{10800}\right)$$

Plot



Geometric figure

line

Alternate forms

$$0.24763\,d - 0.005994$$

$$0.24763\,(1.0000\,d - 0.024204)$$

$$0.12500\left(1.9811\,d - \left(0.048 + 0.\times 10^{-4}\,i\right)\right)$$

Root

$$d \approx 0.024204$$

Derivative

$$\frac{d}{dd}\left(0.24763\,d - \sin\left(\frac{61\,\pi}{27\,000}\right)\cos\left(\frac{173\,\pi}{1350}\right)\cos\left(\frac{1403\,\pi}{10\,800}\right)\right) = 0.24763$$

Indefinite integral

$$\int\left(0.24763\,d - \cos\left(\frac{173\,\pi}{1350}\right)\cos\left(\frac{1403\,\pi}{10\,800}\right)\sin\left(\frac{61\,\pi}{27\,000}\right)\right)dd =$$
$$0.12382\,d^2 - 0.005994\,d + \text{constant}$$

From the indefinite integral result

$$\int\left(0.24763\,d - \cos\left(\frac{173\,\pi}{1350}\right)\cos\left(\frac{1403\,\pi}{10\,800}\right)\sin\left(\frac{61\,\pi}{27\,000}\right)\right)dd =$$
$$0.12382\,d^2 - 0.005994\,d + \text{constant}$$

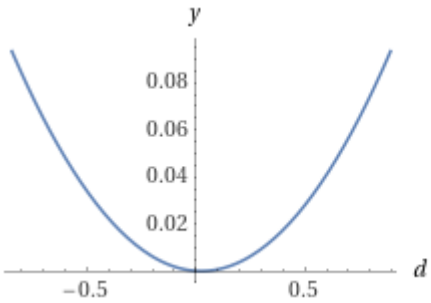
we obtain:

-0.005994 d + 0.12382 d^2

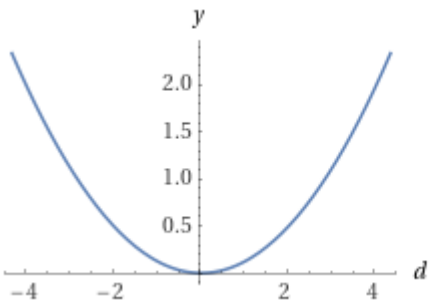
Input

$-0.005994\,d + 0.12382\,d^2$

Plots



(d from −0.8 to 0.9)



(d from −4.3 to 4.4)

Geometric figure

parabola

Alternate forms

$d\,(0.12382\,d - 0.005994)$

$0.12382\,(d - 0.048409)\,d$

$(0.12382\,d - 0.005994)\,d$

Alternate form assuming d is real

$0.12382\,d^2 - 0.005994\,d + 0$

Roots

$d = 0$

$d \approx 0.048409$

Polynomial discriminant

$\Delta = 0.000035928$

Derivative

$$\frac{d}{dd}\left(-0.005994\,d + 0.12382\,d^2\right) = 0.24764\,d - 0.005994$$

Indefinite integral

$$\int \left(-0.005994\,d + 0.12382\,d^2\right) dd = 0.0412733\,d^3 - 0.002997\,d^2 + \text{constant}$$

Global minimum

$$\min\left\{-0.005994\,d + 0.12382\,d^2\right\} = -\frac{8\,982\,009}{123\,820\,000\,000} \text{ at } d = \frac{2997}{123\,820}$$

Definite integral after subtraction of diverging parts

$$\int_0^\infty \left(-0.005994\,d + 0.12382\,d^2\right) - \left(-0.005994\,d + 0.12382\,d^2\right) dd = 0$$

Definite integral area below the axis between the smallest and largest real roots

$$\int_0^{0.048409} \left(-0.005994\, d + 0.12382\, d^2\right) \theta\left(0.005994\, d - 0.12382\, d^2\right) dd = -2.34109 \times 10^{-6}$$

$\theta(x)$ is the Heaviside step function

From the global minimum

$$\min\left\{-0.005994\, d + 0.12382\, d^2\right\} = -\frac{8\,982\,009}{123\,820\,000\,000} \text{ at } d = \frac{2997}{123\,820}$$

min{-0.005994 d + 0.12382 d^2} = -8982009/123820000000 at d = 2997/123820

we consider:

(2997/123820)

Input

$$\frac{2997}{123\,820}$$

Exact result

$$\frac{2997}{123\,820}$$ (irreducible)

Decimal approximation

0.024204490389274753674689064771442416410919076078178000323049588 1

…

Repeating decimal

0.024204490389274753674689064771442416410919076078178000323049588 1

…

(period 75)

0.024204490389….

From which, after some calculations:

(29+Pi)(Pi/(2997/123820))-76+(π/14)

Input

$$(29+\pi)\times\frac{\pi}{\frac{2997}{123\,820}}-76+\frac{\pi}{14}$$

Result

$$-76+\frac{\pi}{14}+\frac{123\,820\,\pi\,(29+\pi)}{2997}$$

Decimal approximation

4096.003673949744952004608287098008157477303438380944936483775117 7

…

4096.003673949...≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of

matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Property

$-76+\frac{\pi}{14}+\frac{123\,820\,\pi\,(29+\pi)}{2997}$ is a transcendental number

Alternate form

$$\frac{-3\,188\,808+50\,273\,917\,\pi+1\,733\,480\,\pi^2}{41\,958}$$

Expanded form

$$-76+\frac{50\,273\,917\,\pi}{41\,958}+\frac{123\,820\,\pi^2}{2997}$$

Alternative representations

$$\frac{(29+\pi)\,\pi}{\frac{2997}{123\,820}}-76+\frac{\pi}{14}=-76-\frac{1}{14}\,i\log(-1)-\frac{i\,(\log(-1)\,(29-i\log(-1)))}{\frac{2997}{123\,820}}$$

$$\frac{(29+\pi)\,\pi}{\frac{2997}{123\,820}} - 76 + \frac{\pi}{14} = -76 + \frac{1}{14}\cos^{-1}(-1) + \frac{\cos^{-1}(-1)\left(29+\cos^{-1}(-1)\right)}{\frac{2997}{123\,820}}$$

$$\frac{(29+\pi)\,\pi}{\frac{2997}{123\,820}} - 76 + \frac{\pi}{14} = -76 + \frac{180^\circ}{14} + \frac{180^\circ\,(29+180^\circ)}{\frac{2997}{123\,820}}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\frac{(29+\pi)\,\pi}{\frac{2997}{123\,820}} - 76 + \frac{\pi}{14} = \frac{2\left(-797\,202 + 50\,273\,917\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k} + 6\,933\,920\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}\right)^2\right)}{20\,979}$$

$$\frac{(29+\pi)\,\pi}{\frac{2997}{123\,820}} - 76 + \frac{\pi}{14} = \frac{1}{41\,958}\left(-3\,188\,808 + 50\,273\,917\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right) + 1\,733\,480\left(\sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)\right)^2\right)$$

$$\frac{(29+\pi)\,\pi}{\frac{2997}{123\,820}}-76+\frac{\pi}{14}=\frac{1}{41\,958}$$

$$\left(-3\,188\,808+50\,273\,917\times\sum_{k=0}^{\infty}16^{-k}\left(\frac{1}{-5-8k}-\frac{1}{2+4k}+\frac{4}{1+8k}-\frac{1}{6+8k}\right)+1\,733\,480\left(\sum_{k=0}^{\infty}16^{-k}\left(\frac{1}{-5-8k}-\frac{1}{2+4k}+\frac{4}{1+8k}-\frac{1}{6+8k}\right)\right)^2\right)$$

Integral representations

$$\frac{(29+\pi)\,\pi}{\frac{2997}{123\,820}}-76+\frac{\pi}{14}=\frac{-1\,594\,404+50\,273\,917\int_0^{\infty}\frac{1}{1+t^2}\,dt+3\,466\,960\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2}{20\,979}$$

$$\frac{(29+\pi)\,\pi}{\frac{2997}{123\,820}}-76+\frac{\pi}{14}=\frac{2\left(-797\,202+50\,273\,917\int_0^1\sqrt{1-t^2}\,dt+6\,933\,920\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2\right)}{20\,979}$$

$$\frac{(29+\pi)\,\pi}{\frac{2997}{123\,820}}-76+\frac{\pi}{14}=\frac{-1\,594\,404+50\,273\,917\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt+3\,466\,960\left(\int_0^1\frac{1}{\sqrt{1-t^2}}\,dt\right)^2}{20\,979}$$

27*sqrt((29+Pi)(Pi/(2997/123820))-76+(π/14))+1

Input

$$27\sqrt{(29+\pi)\times\frac{\pi}{\frac{2997}{123\,820}}-76+\frac{\pi}{14}}+1$$

Exact result

$$1+27\sqrt{-76+\frac{\pi}{14}+\frac{123\,820\,\pi\,(29+\pi)}{2997}}$$

Decimal approximation

1729.000774973600545697284918783374621167617431981847532684223067 7

…

1729.0007749736…

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Property

$1+27\sqrt{-76+\frac{\pi}{14}+\frac{123\,820\,\pi\,(29+\pi)}{2997}}$ is a transcendental number

Alternate forms

$$\frac{1}{518}\left(518+3\sqrt{518\left(-3\,188\,808+50\,273\,917\,\pi+1\,733\,480\,\pi^2\right)}\right)$$

$$\frac{\sqrt{518}+3\sqrt{-3\,188\,808+50\,273\,917\,\pi+1\,733\,480\,\pi^2}}{\sqrt{518}}$$

Series representations

$$27\sqrt{\frac{(29+\pi)\,\pi}{\frac{2997}{123\,820}}-76+\frac{\pi}{14}}+1=1+27\sqrt{-77+\frac{\pi}{14}+\frac{123\,820\,\pi\,(29+\pi)}{2997}}\sum_{k=0}^{\infty}\left(-77+\frac{\pi}{14}+\frac{123\,820\,\pi\,(29+\pi)}{2997}\right)^{-k}\binom{\frac{1}{2}}{k}$$

$$27\sqrt{\frac{(29+\pi)\,\pi}{\frac{2997}{123\,820}}-76+\frac{\pi}{14}}+1=1+27\sqrt{-77+\frac{\pi}{14}+\frac{123\,820\,\pi\,(29+\pi)}{2997}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-77+\frac{\pi}{14}+\frac{123\,820\,\pi\,(29+\pi)}{2997}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$27\sqrt{\frac{(29+\pi)\,\pi}{\frac{2997}{123\,820}}-76+\frac{\pi}{14}}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-76+\frac{\pi}{14}+\frac{123\,820\,\pi\,(29+\pi)}{2997}-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

(27*sqrt((29+Pi)(Pi/(2997/123820))-76+(π/14))+1)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{27\sqrt{(29+\pi)\times\frac{\pi}{\frac{2997}{123\,820}}-76+\frac{\pi}{14}}+1}+C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Exact result

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\sqrt[15]{1+27\sqrt{-76+\frac{\pi}{14}+\frac{123\,820\,\pi\,(29+\pi)}{2997}}}$$

Decimal approximation

1.644938073249718133063776395616753220399945216605302927649012051 0…

1.64493807324…≈ ζ(2) = π²/6 = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\sqrt[15]{\frac{1}{518}\left(518+3\sqrt{518\left(-3\,188\,808+50\,273\,917\,\pi+1\,733\,480\,\pi^2\right)}\right)}$$

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi}+\frac{\sqrt[15]{\sqrt{518}+3\sqrt{-3\,188\,808+50\,273\,917\,\pi+1\,733\,480\,\pi^2}}}{\sqrt[30]{518}}$$

$$\frac{1}{518}\, C_{\mathrm{MRB}}{}^{-1/(4\pi)} \left(518\, C_{\mathrm{MRB}}{}^{1+\pi} + 518^{14/15} \sqrt[15]{518 + 3\sqrt{518\left(-3\,188\,808 + 50\,273\,917\pi + 1\,733\,480\pi^2\right)}}\ \sqrt[4\pi]{C_{\mathrm{MRB}}} \right)$$

(V. vol. II di queste Memorie a pag. 137) ho desunto i valori dell'elongazione apparente e del centro della Luna dal centro del Sole pei tempi medesimi delle tabelle precedenti

tempi m. di Padova	$20^h\,55^m\,30^s$	$20^h\,56^m\,0^s$	$23^h\,45^m\,0^s$	$23^h\,45^m\,30^s$
elongazioni $= e$	$30'.38'',76$	$30'.29'',68$	$31'.3',44$	$31'.12'',20$

Con semplici proporzioni dai valori così calcolati si dedussero, pei tempi del principio e della fine dell'eclisse ottenuti dai tre osservatori, gli elementi di questo quadro.

	Principio dell'eclisse			*Fine dell'eclisse*		
	Lorenzoni	*Abetti*	*Ciscato*	*Lorenzoni*	*Abetti*	*Ciscato*
T. m. di Padova.	$20^h\,55^m\,37^s,7$	$20^h\,55^m\,41^s,0$	$20^h\,55^m\,48^s,0$	$23^h\,45^m\,28^s,0$	$23^h\,45^m\,20^s,0$	$23^h\,45^m\,14^s,1$
$\alpha' - A'$	$-\ 25'.36'',00$	$-\ 25'.33'',57$	$-\ 25'.32'',02$	$+\ 33'.37'',92$	$+\ 33'.35'',27$	$+\ 33'.33'',31$
$\delta' - D'$	$-\ 19.34,43$	$-\ 19.33,80$	$-\ 19.33,40$	$-\ 4.26,72$	$-\ 4.27,20$	$-\ 4.27,55$
ρ'	$15.7,90$	$15.7,90$	$15.7,91$	$15.9,92$	$15.9,92$	$15.9,91$
R'	$15.46,52$	$15.46,52$	$15.46,52$	$15.46,53$	$15.46,53$	$15.46,53$
δ'	$23°.4'.0'',4$	$23°.4'.1'',0$	$23°.4'.1'',5$	$23°.19'.21'',0$	$23°.19'.20'',5$	$23°.19'.20'',1$
D'	$23.23.34,8$	$23.23.34,8$	$23.23.34,9$	$23.23.47,7$	$23.23.47,7$	$23.23.47,6$
e	$30.36,17$	$30.34,06$	$30.32,71$	$31.11,72$	$31.9,28$	$31.7,56$
$\rho' + R' - e$	$+\ 18,25$	$+\ 20,36$	$+\ 21,72$	$-\ 15,17$	$-\ 12,83$	$-\ 11,12$

Calcolati i coefficienti della equazione di condizione

$$\rho' + R' - e = \frac{\operatorname{sen}(\delta' - D')}{\operatorname{sen} e}\, d(\delta' - D') + \cos\delta' \cos D' \frac{\operatorname{sen}(\alpha' - A')}{\operatorname{sen} e}\, d(\alpha' - A') - d(\rho' + R')$$

(V. al luogo sopra citato pag. 138) si sono stabilite le seguenti equazioni numeriche.

Lorenzoni.

$$\text{Principio } +18'',2 = -0.6396\, d(\delta' - D') - 0.7064\, d(\alpha' - A') - d(\rho' + R')$$
$$\text{Fine } \quad -15,2 = -0.1425\, d(\delta' - D') + 0.9087\, d(\alpha' - A') - d(\rho' + R')$$

Abetti.

$$\text{Principio } +20,4 = -0.6400\, d(\delta' - D') - 0.7061\, d(\alpha' - A') - d(\rho' + R')$$
$$\text{Fine } \quad -12,8 = -0.1429\, d(\delta' - D') + 0.9086\, d(\alpha' - A') - d(\rho' + R')$$

Ciscato.

$$\text{Principio } +21,7 = -0.6403\, d(\delta' - D') - 0.7059\, d(\alpha' - A') - d(\rho' + R')$$
$$\text{Fine } \quad -11,1 = -0.1433\, d(\delta' - D') + 0.9086\, d(\alpha' - A') - d(\rho' + R')$$

Riservando la deduzione del $d R'$ da ciascuna delle sei equazioni a quando si potranno introdurre in esse valori plausibili per le altre incognite ivi contenute, si può dal paragone

Now, we consider:

Principio $+ 18'',2 = -0.6396\, d\,(\delta' - D') - 0.7064\, d\,(\alpha' - A') - d\,(\rho' + R')$
Fine $\quad - 15\ ,2 = -0.1425\, d\,(\delta' - D') + 0.9087\, d\,(\alpha' - A') - d\,(\rho' + R')$

T. m. di Padova.	$20^h\ 55^m\ 37^s,7$	$20^h\ 55^m\ 41^s,0$	$20^h\ 55^m\ 48^s,0$	$23^h\ 45^m\ 28^s,0$	$23^h\ 45^m\ 20^s,0$	$23^h\ 45^m\ 14^s,1$
$\alpha' - A'$	$-\ 25'.36'',00$	$-\ 25'.33'',57$	$-\ 25'.32'',02$	$+\ 33'.37'',92$	$+\ 33'.35'',27$	$+\ 33'.33'',31$
$\delta' - D'$	$-\ 19\ .34\ ,43$	$-\ 19\ .33\ ,80$	$-\ 19\ .33\ ,40$	$-\ 4\ .26\ ,72$	$-\ 4\ .27\ ,20$	$-\ 4\ .27\ ,55$
ρ'	$15\ .7\ ,90$	$15\ .7\ ,90$	$15\ .7\ ,91$	$15\ .9\ ,92$	$15\ .9\ ,92$	$15\ .9\ ,91$
R'	$15\ .46\ ,52$	$15\ .46\ ,52$	$15\ .46\ ,52$	$15\ .46\ ,53$	$15\ .46\ ,53$	$15\ .46\ ,53$
δ'	$23°.4'\ .0'',4$	$23°.4'\ .1'',0$	$23°.4'\ .1'',5$	$23°.19'.21'',0$	$23°.19'.20'',5$	$23°.19'.20'',1$
D'	$23\ .23.34\ ,8$	$23\ .23.34\ ,8$	$23\ .23.34\ ,9$	$23\ .23.47\ ,7$	$23\ .23.47\ ,7$	$23\ .23.47\ ,6$
e	$30.36\ ,17$	$30.34\ ,06$	$30.32\ ,71$	$31.11\ ,72$	$31.9\ ,28$	$31.7\ ,56$
$\rho' + R' - e$	$+\ 18\ ,25$	$+\ 20\ ,36$	$+\ 21\ ,72$	$-\ 15\ ,17$	$-\ 12\ ,83$	$-\ 11\ ,12$

((-0.6396*d*(-19’ 34”)-0.7064*d*(-25’ 36”)-d*((15’ 7”)+(15’ 46”))))+((-0.1425*d*(-4’ 26”)+0.9087*d*(33’ 37”)-d*8(15’ 9”)+(15’ 46”))))

for d = 1:

(((-0.6396*(-19’ 34”)-0.7064*(-25’ 36”)-1*((15’ 7”)+(15’ 46”))))+((-0.1425*(-4’ 26”)+0.9087*(33’ 37”)-1*8(15’ 9”)+(15’ 46”))))

Input interpretation

(−0.6396 (−19 arcminutes 34 arcseconds) −
0.7064 (−25 arcminutes 36 arcseconds) −
1 (15 arcminutes 7 arcseconds + 15 arcminutes 46 arcseconds)) +
(−0.1425 (−4 arcminutes 26 arcseconds) +
0.9087 (33 arcminutes 37 arcseconds) −
1 × 8 (15 arcminutes 9 arcseconds) + 15 arcminutes 46 arcseconds)

Results

−76 arcminutes 14.09 arcseconds

− 76.23' (arcminutes)

Unit conversions

− 1.271° (degrees)

−1 degree 16 arcminutes 14 arcseconds

$-5^{m}\ 4.9^{s}$ (right ascension)

− 22.18 mrad (milliradians)

− 0.02218 radians

Comparisons

≈ −0.25 ×
angular width spanned between the three middle fingers held at arm's length (≈ 5°)

≈ −0.32 × angle at which the Leaning Tower of Pisa leans (≈ 3.99°)

≈ −1.3 × angular width of the little finger held at arm's length (≈ 1°)

Interpretation

plane angle

Basic unit dimensions

[angle]

From

– 0.02218 radians

after some calculations, we obtain:

12(-Pi/(-0.02204)+Pi/2)-Pi/9

Input

$$12\left(\frac{-\pi}{-0.02204}+\frac{\pi}{2}\right)-\frac{\pi}{9}$$

Result

1728.99…

1728.99….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a

glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternative representations

$$12\left(\frac{-\pi}{-0.02204}+\frac{\pi}{2}\right)-\frac{\pi}{9}=12\left(90^\circ--\frac{180^\circ}{0.02204}\right)-\frac{180^\circ}{9}$$

$$12\left(\frac{-\pi}{-0.02204}+\frac{\pi}{2}\right)-\frac{\pi}{9}=12\left(-\frac{1}{2}\,i\log(-1)+-\frac{i\log(-1)}{0.02204}\right)+\frac{1}{9}\,i\log(-1)$$

$$12\left(\frac{-\pi}{-0.02204}+\frac{\pi}{2}\right)-\frac{\pi}{9}=12\left(E(0)--\frac{2\,E(0)}{0.02204}\right)-\frac{2\,E(0)}{9}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$E(m)$ is the complete elliptic integral of the second kind with parameter $m = k^2$

Series representations

$$12\left(\frac{-\pi}{-0.02204}+\frac{\pi}{2}\right)-\frac{\pi}{9}=2201.41\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$12\left(\frac{-\pi}{-0.02204}+\frac{\pi}{2}\right)-\frac{\pi}{9}=-1100.71+1100.71\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}$$

$$12\left(\frac{-\pi}{-0.02204}+\frac{\pi}{2}\right)-\frac{\pi}{9}=550.353\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50k)}{\binom{3k}{k}}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$12\left(\frac{-\pi}{-0.02204}+\frac{\pi}{2}\right)-\frac{\pi}{9}=1100.71\int_0^{\infty}\frac{1}{1+t^2}\,dt$$

$$12\left(\frac{-\pi}{-0.02204}+\frac{\pi}{2}\right)-\frac{\pi}{9}=2201.41\int_0^{1}\sqrt{1-t^2}\,dt$$

$$12\left(\frac{-\pi}{-0.02204}+\frac{\pi}{2}\right)-\frac{\pi}{9}=1100.71\int_0^{\infty}\frac{\sin(t)}{t}\,dt$$

(12(-Pi/(-0.02204)+Pi/2)-Pi/9)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{12\left(\frac{-\pi}{-0.02204}+\frac{\pi}{2}\right)-\frac{\pi}{9}}+C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Result

1.64493716899840288618436441173092466008244977658839527018332202 02…

1.64493716899…≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

(1/27((12(-Pi/(-0.02204)+Pi/2)-Pi/9)-1))^2

Input

$$\left(\frac{1}{27}\left(\left(12\left(\frac{-\pi}{-0.02204}+\frac{\pi}{2}\right)-\frac{\pi}{9}\right)-1\right)\right)^2$$

Result

4095.94…

4095.94…≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of

matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Messina-Reggio Calabria earthquake of 28 December 1908

Let's start from the Solar Eclipse of December 22, 1889, to which we add a Saros Cycle:

12:54:15 pm 22.12.1889+18 years 11 days 8 hours 42 minutes

Input interpretation

12:54:15 pm RMT | Sunday, December 22, 1889 +
18 years 11 days 8 hours 42 minutes

Result

9:36:15 pm CET | Thursday, January 2, 1908

We observe that:

3 Gennaio 1908	**LUNA NUOVA** alle 21:43 **Eclissi solare**

From the previous date we add a Lunar Year

Jan 2, 1908 9:36:15 pm+354 days 8 hours 48 minutes 36 seconds

Input interpretation

9:36:15 pm CET | Thursday, January 2, 1908 +
354 days 8 hours 48 minutes 36 seconds

Result

6:24:51 am CET | Tuesday, December 22, 1908

22 Dicembre 1908 = final date.

We observe that:

23 Dicembre 1908	**LUNA NUOVA** alle 11:49 **Eclissi solare**

The 1908 Messina earthquake (cited in scientific literature as the Southern Calabria-Messina earthquake or also as the Calabrian-Sicilian earthquake) is considered one of the most catastrophic seismic events of the 20th century. The earthquake, of magnitude 7.1 Mw, occurred at 5:20:27 am (local time) on 28 December 1908 and seriously damaged the cities of Messina and Reggio Calabria within 37 seconds.

In addition to the solar eclipse of December 23rd, during a new moon, we highlight that on December 30th the Moon was in quadrature (First Quarter). The earthquake occurred exactly 5 days after the eclipse and 2 days before the quadrature tide caused by the crescent Moon (First Quarter) and 9 days before the Full Moon of 6 January 1909 in which 6 strong aftershocks occurred.

The three dates 23 December, 30 December and 6 January give as arithmetic averages:

(23+30+(31+6))/3 = December 30

(23 + 30)/2 = 26.5 ;

30 + 26.5 = 56.5 / 2 = 28.25 ≈ December 28

Towards the prevision

This “seismic maximum” had already been preparing since November 1908. On 7 and 18 November 1908, earthquakes hit the province of Arezzo, the Middle Adriatic, the province of Bolzano and the province of Pordenone. From November 23rd to December 28th, the date of the very violent shock, accompanied by a tsunami,

earthquake shocks hit exclusively the south of Calabria and Sicily, with the exception of December 18th when Austria was hit by a seismic event . Therefore, the Calabrian-Sicilian earthquake was preceded by at least a month of tremors, in the area where the epicenter was located, which preceded the main event. The 11 strongest events, before the December 28th event, occurred on 23.11, 2.12, 4.12, 10.12, 14.12 and 18.12 (7 December Full Moon, 15 December Last Quarter Moon).

The solar eclipse of August 12, 1673

To that date, let's add 6 Saros cycles (18*6 = approximately 108 years)

12.08.1673 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Saturday, August 12, 1673 (Gregorian calendar) +
108 years 68 days 4 hours 12 minutes

Result

4:12 am LMT | Friday, October 19, 1781

To this date (19.10 1781), we add a lunar year + a quarter

and again:

4:12 am Friday, October 19, 1781 + 472 days 11 hours 44 minutes 48 seconds

Input interpretation

4:12 am LMT | Friday, October 19, 1781 +
472 days 11 hours 44 minutes 48 seconds

Result

3:56:48 pm LMT | Monday, February 3, 1783

February 3 1783 = Final date

The great earthquakes of southern Calabria in 1783 (also called the Reggio and Messina earthquake of 1783) refer to an intense seismic sequence which affected the area of the Strait of Messina and southern Calabria, culminating with 5 strong

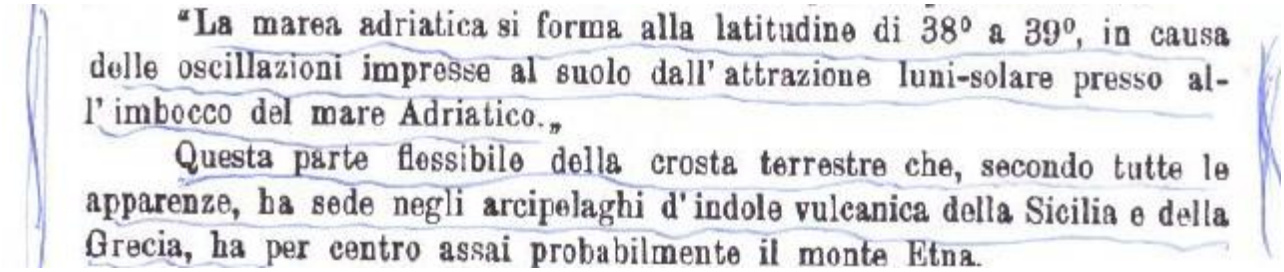
tremors, exceeding Mw 5.9, between February 5 and March 28, 1783. (M = 7.0). On January 4, 1783, a superior conjunction of Venus (Venus-Sun Earth) occurred. On 2 February and 1-2 April 1783 there was a new moon.

Towards the earthquake prediction

Strong earthquakes already struck in the months of September 1782 (24.09) and January 1783 (02.01.1783), Rocca di Papa (Lazio) and Sutrio (Friuli Venezia-Giulia)

Observations towards the prevision

It seems clear that the earthquake will "move" like a sort of "tidal current" from the centre-north (Lazio, Tuscany, the Middle Adriatic, Trentino-Alto Adige, Friuli Venezia-Giulia) to the South (Campania, Calabria and Sicily). Prof. Giulio Grablovitz in his work “On the tides of the Adriatic”, states that:



"La marea adriatica si forma alla latitudine di 38° a 39°, in causa delle oscillazioni impresse al suolo dall' attrazione luni-solare presso all' imbocco del mare Adriatico.„

Questa parte flessibile della crosta terrestre che, secondo tutte le apparenze, ha sede negli arcipelaghi d' indole vulcanica della Sicilia e della Grecia, ha per centro assai probabilmente il monte Etna.

Vortex of Cariddi

Between Punta Pezzo in Calabria and Capo Peloro or Capo Faro in Sicily the underwater threshold rises until it reaches one hundred meters below sea level. Now it happens that when in the Tyrrhenian Sea to the north, there is high tide south of the threshold, in the Ionian Sea there is low tide and vice versa. This continuous alternation of low and high tides gives rise to alternating flows and ebbs of water from one sea to the other which generate tides with an average difference in height of 15-20 cm, with maximum peaks of up to 50 cm, in a complete cycle of 24 hours and 50 minutes. This creates violent movements of masses of water in a horizontal direction and rapid emergences of deep water, which generate extensive and swirling whirlpools called refoli (garofuli). The rising rema, i.e. the flow current that goes from the Ionian Sea to the Tyrrhenian Sea, begins in the Strait about two hours after

the passage of the moon over the Messina meridian, runs at a speed of about 9 km per hour and lasts average of about 6 hours. The ebb or descending row begins a slow descent towards the Ionian sea 4 hours before this passage and also generates a current of approximately 9 km per minute (max 12).

Thus, during the dominance of one and the other of these currents, two secondary counter-currents are generated along the two banks of the Strait which form some small eddies along the aforementioned coasts: three main eddies, true vortices, are produced along the Strait one near the Lanterna di Messina where the main current meets the countercurrent coming out of the port and the coastal countercurrent; another vortex is formed from Punta Pezzo in Calabria where the dominant current is forced to fall back due to the configuration of the Strait and therefore to resist the coastal countercurrent; a third vortex is formed near the Ganzirri beach and is of less importance than the others. The current front is called shear, the countercurrent fronts are called gusts.

And again, writes Prof. Giulio Grablovitz:

Nel resto del Mediterraneo le maree sono quasi insignificanti; in aggiunta a quanto già dissi in proposito, accenno di volo al modo singolare in cui si manifestano le maree a Messina; benchè manchino dati precisi, si sa che sono molto irregolari ed assai più repentine che nell'Adriatico, vale a dire che i momenti della massima e minima altezza si possono valutare ad occhio senza errore apprezzabile, mentre a Trieste od a Venezia il più attento osservatore può ingannarsi di 15 minuti, senza l'aiuto di strumenti autoregistratori. Ne attribuisco la causa alla grande vicinanza del punto radiante, verso il quale tutte le acque convergono *contemporaneamente* nel momento della massima depressione del suolo, mentre ne divergono nella stessa guisa nel caso opposto. Probabilmente l'imponente vortice di Cariddi ha relazione col fenomeno delle maree, tanto più che il terremoto avvenuto in Sicilia ed in Calabria dopo il mezzodì del 5 febbraio 1783 ne scemò, a quanto si asserisce, la violenza.

It therefore seems that a luni-solar gravitational disturbance, such as that triggered by syzygy tides (new moons and full moons) and solar eclipses, is followed by a tidal response along the Adriatic Sea, which has as references to the north Trieste and Venice, and to the south, in the center the Messina area and the Mount Etna area,

whose part of the earth's crust is more flexible. In these areas, the tides occur much more suddenly than in the Adriatic, also giving rise to violent phenomena such as the Charybdis Vortex. This vortex, after the earthquakes that shook Calabria and Sicily on 5 February 1783, reportedly diminished in violence, proof of the fact that the rise in sea level coincides with a seismic maximum, which once occurred , follows the reverse phenomenon of descent of the water mass

Tide table for Venice

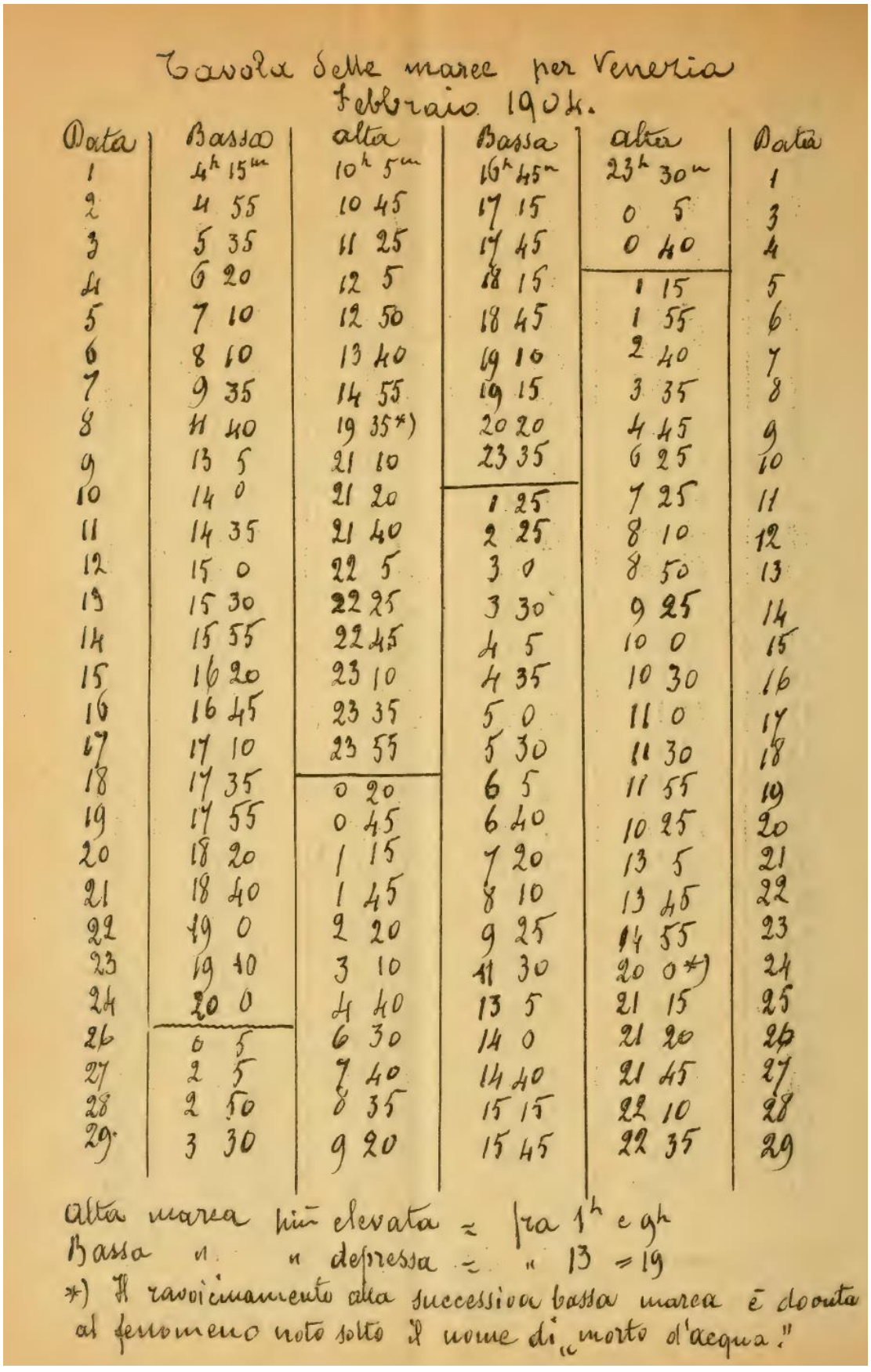


Tavola delle maree per Venezia
Febbraio 1904.

Data	Bassa	alta	Bassa	alta	Data
1	4h 15m	10h 5m	16h 45m	23h 30m	1
2	4 55	10 45	17 15	0 5	3
3	5 35	11 25	17 45	0 40	4
4	6 20	12 5	18 15	1 15	5
5	7 10	12 50	18 45	1 55	6
6	8 10	13 40	19 10	2 40	7
7	9 35	14 55	19 15	3 35	8
8	11 40	19 35*)	20 20	4 45	9
9	13 5	21 10	23 35	6 25	10
10	14 0	21 20	1 25	7 25	11
11	14 35	21 40	2 25	8 10	12
12	15 0	22 5	3 0	8 50	13
13	15 30	22 25	3 30	9 25	14
14	15 55	22 45	4 5	10 0	15
15	16 20	23 10	4 35	10 30	16
16	16 45	23 35	5 0	11 0	17
17	17 10	23 55	5 30	11 30	18
18	17 35	0 20	6 5	11 55	19
19	17 55	0 45	6 40	10 25	20
20	18 20	1 15	7 20	13 5	21
21	18 40	1 45	8 10	13 45	22
22	19 0	2 20	9 25	14 55	23
23	19 40	3 10	11 30	20 0*)	24
24	20 0	4 40	13 5	21 15	25
26	0 5	6 30	14 0	21 20	26
27	2 5	7 40	14 40	21 45	27
28	2 50	8 35	15 15	22 10	28
29	3 30	9 20	15 45	22 35	29

Alta marea più elevata = fra 1h e 9h
Bassa " " depressa = " 13 = 19

*) Il ravvicinamento alla successiva bassa marea è dovuta al fenomeno noto sotto il nome di „morto d'acqua."

24 February 1904 8pm Low Tide to High Tide = First Quarter Moon (Crescent Moon); 24 February 1904 Earthquake in the Marsica 15h 53m 26s PM – 5.7° R; At 9.58pm Italian time on 10 September 2017, an earthquake with a magnitude of ML 3.9 (Mw 3.7) was located in the province of L'Aquila, in the Piana del Fucino (Marsica)

(6 Saros cycles)

24.02.1904 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Wednesday, February 24, 1904 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Wednesday, May 2, 2012

Adding 5 lunar years plus one semester:

May 2, 2012 4:12 am + 1949 days 27 minutes 18 seconds

Input interpretation

4:12 am CEST | Wednesday, May 2, 2012 + 1949 days 27 minutes 18 seconds

Result

4:39:18 am CEST | Saturday, September 2, 2017

08.21.2017 Solar eclipse; Full Moon 06.09.2017; Last Quarter 13.09.2017

Tides 24 February 1904

20 hours 0 minutes – 4 hours 40 minutes

11 hours 30 minutes – 20 hours 0 minutes

(20 hours 0 minutes – 4 hours 40 minutes)+ (11 hours 30 minutes – 20 hours 0 minutes)

Input interpretation

(20 hours – 4 hours 40 minutes) + (11 hours 30 minutes – 20 hours)

Results

6 hours 50 minutes

6.833 hours

---

410 minutes

Unit conversions

24 600 seconds

From

24 600 seconds

we obtain:

288(24600/4096)-1/√2

Input

$$288 \times \frac{24\,600}{4096} - \frac{1}{\sqrt{2}}$$

Result

$$\frac{27\,675}{16} - \frac{1}{\sqrt{2}}$$

Decimal approximation

1728.980393218813452475599155637895150960715164062311525963411660 1

…

1728.9803932188…

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

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thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternate forms

$$\frac{1}{16}\left(27675 - 8\sqrt{2}\right)$$

$$\frac{27675}{16} - \frac{\sqrt{2}}{2}$$

$$\frac{27675\sqrt{2} - 16}{16\sqrt{2}}$$

Minimal polynomial

$$256x^2 - 885600x + 765905497$$

(288(24600/4096)-1/√2)^1/15+(MRB const)^(1-1/(4π)+π)

Input

$$\sqrt[15]{288 \times \frac{24600}{4096} - \frac{1}{\sqrt{2}}} + C_{\text{MRB}}{}^{1-1/(4\pi)+\pi}$$

C_{MRB} is the MRB constant

Exact result

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi} + \sqrt[15]{\frac{27\,675}{16} - \frac{1}{\sqrt{2}}}$$

Decimal approximation

1.644936781404366195189170855026766809528298334540789759993983433 6

…

1.6449367814…≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi} + \frac{\sqrt[15]{27\,675 - 8\sqrt{2}}}{2^{4/15}}$$

$$C_{\text{MRB}}^{\,1-1/(4\pi)+\pi} + \frac{\sqrt[15]{27\,675\sqrt{2} - 16}}{2^{3/10}}$$

$$\frac{2^{4/15}\, C_{\text{MRB}}^{\,1-1/(4\pi)+\pi} + \frac{\sqrt[15]{27\,675\sqrt{2} - 16}}{\sqrt[30]{2}}}{2^{4/15}}$$

Tavola delle maree per Venezia.

Ottobre 1904.

Data	Alta	Bassa	alta	Bassa	Data
1	2h 25m	6h 45m	13h 35m	21h 0m	1
2	4 25	7 15	14 20	23 0	2
3	7 30	10 15	16 30	0 45	4
4	8 40	13 45	19 10	1 45	5
5	8 55	14 35	20 15	2 30	6
6	9 20	15 5	21 5	3 5	7
7	9 45	15 40	21 45	3 40	8
8	10 15	16 20	22 30	4 15	9
9	10 45	16 50	23 5	4 45	10
10	11 15	17 30	23 50	5 15	11
11	11 45	18 5	0 25	5 45	12
12	12 10	18 40	1 10	6 10	13
13	12 40	19 20	2 0	6 40	14
14	13 10	20 5	3 30	7 15	15
15	13 40	21 30	5 50	9 10	16
16	14 40	23 10	7 45	12 45	17
17	17 35	0 40	8 10	14 0	18
18	19 20	1 30	8 35	14 30	19
19	20 15	2 5	9 0	14 55	20
20	20 55	2 40	9 20	15 20	21
21	21 30	3 10	9 45	15 50	22
22	22 0	3 40	10 10	16 15	23
23	22 35	4 5	10 30	16 45	24
24	23 5	4 30	10 55	17 10	25
25	23 40	5 0	11 20	17 40	26
27	0 15	5 25	11 40	18 15	27
28	0 50	5 50	12 5	18 45	28
29	1 30	6 20	12 35	19 25	29
30	2 30	7 0	13 5	20 10	30
31	4 0	8 35	13 45	21 40	31

Alta marea più elevata = fra le 9h e 14h.
Bassa " " depressa = " " 17 e 3h.

On October 23, 1904, a 5.4 magnitude earthquake struck Oslo (Norway)

23.10.1904 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Sunday, October 23, 1904 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CET | Sunday, December 30, 2012

(1/5 Saros cycle + 2 lunar months)

Dec 30, 2012 4:12 am + 3 years 221 days 6 hours 32.4 minutes+59 days 1 hour 28 minutes

Input interpretation

(4:12 am CET | Sunday, December 30, 2012 +
3 years 221 days 6 hours 32.4 minutes) + 59 days 1 hour 28 minutes

Result

12:12:24 pm CEST | Wednesday, October 5, 2016

9 October 2016 – First Quarter (waxing moon)

Tides October 23, 1904

22 hours 35 minutes - 4 hours 5 minutes

10 hours 10 minutes – 16 hours 15 minutes

(22 hours 35 minutes - 4 hours 5 minutes)+(10 hours 10 minutes – 16 hours 15 minutes)

Input interpretation

(22 hours 35 minutes – 4 hours 5 minutes) +
(10 hours 10 minutes – 16 hours 15 minutes)

Results

12 hours 25 minutes

12.42 hours

---

745 minutes

Unit conversions

44 700 seconds

From

44 700 seconds

we obtain:

18*1/(44700/4096)

Input

$$18 \times \frac{1}{\frac{44700}{4096}}$$

Exact result

$$\frac{6144}{3725}$$

Decimal approximation

1.64939597315436241610738255033557046979865771812080536912751677 85
…

1.6493959731…≈ $\zeta(2) = \pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

From the previous results, we obtain:

24600 seconds = degrees

Input interpretation

convert 24600" (arcseconds) to degrees

Results

6.833° (degrees)

6.833°

6 degrees 50 arcminutes

Additional conversions

119.3 mrad (milliradians)

0.1193 radians

27^{m} 20^{s} (right ascension)

Speed of Seismic waves

$$\begin{aligned}
&\text{Greenwich: } \varphi = 51°29'; \quad \lambda = 0°;\\
&\text{Roma CR; } \varphi_0 = 41°54'; \ \lambda_0 = 12°29';\\
&\lambda - \lambda_0 = \Delta = 12°29';\\
&\varphi - \varphi_0 = m = 9°35'; \ \cos m = 0{\cdot}9860445\\
&\varphi + \varphi_0 = n = 93°23'; \cos n = -0{\cdot}0590160\\
&\qquad\qquad \tfrac{1}{2}(\cos m - \cos n) = 0{\cdot}5225302
\end{aligned}$$

$$\begin{aligned}
m - \Delta &= -\ 2°54'; \ \cos = \ 0{\cdot}9987194\\
m + \Delta &= \ 22°\ 4'; \ \text{»} = \ 0{\cdot}9267474\\
n - \Delta &= \ 80°54'; \ \text{»} = \ 0{\cdot}1581581\\
n + \Delta &= 105°52'; \ \text{»} = -0{\cdot}2733997
\end{aligned}$$

$$\Sigma = 1{\cdot}8102252; \ \tfrac{1}{4}\Sigma = 0{\cdot}4525563$$

$$\cos \alpha = 0{\cdot}9750865$$

$$\alpha = 12°49'$$

Trieste longitude

(Δ = 13° 47') ; m = (51° 29' – 6° 50')

Input interpretation

51 degrees 29 arcminutes – 6 degrees 50 arcminutes

Results

44 degrees 39 arcminutes

44.65° (degrees)

44.65°

Unit conversions

779.3 mrad (milliradians)

0.7793 radians

$2^{h}\ 58^{m}\ 36^{s}$ (right ascension)

49.61 grads
(unit officially deprecated)

0.4961 quad (quadrants)

Comparisons as plane angle

≈ angle of repose of crushed stone gravel (≈ 45°)

≈ (1 to 1.2) × angle of repose of fresh coffee beans (35 to 45°)

≈ 1.2 × angle of repose of snow (≈ 38°)

Comparisons as angular elongation

≈ (0.95 to 0.99) × maximum elongation of Venus (45 to 47°)

≈ (1.6 to 2.5) × maximum elongation of Mercury (18 to 28°)

Interpretations

plane angle

angular elongation

Basic unit dimensions

[angle]

Corresponding quantities

Rotation count N from $N = \varphi/(2\pi)$:

0.12 rot (rotations)

Slope percentage from [slope percentage] $= 100\% \times \tan(\theta)$:

98.79 slope% (slope percent)

Electric loss factor d from $\delta = \tan^{-1}(d)$:

0.9879

Quality factor Q from $\delta d = \tan^{-1}(1/Q)$:

1.012

$\tan^{-1}(x)$ is the inverse tangent function

n = (51° 29’ + 6° 50’)

Input interpretation

51 degrees 29 arcminutes + 6 degrees 50 arcminutes

Results

58 degrees 19 arcminutes

58.32° (degrees)

58.32°

Unit conversions

1.018 radians

0.001018 krad (kiloradians)

$3^{h}\ 53^{m}\ 16^{s}$ (right ascension)

64.8 grads
(unit officially deprecated)

0.648 quad (quadrants)

Comparisons as plane angle

≈ (0.16 ≈ 1/6) × full angle (2 π rad)

≈ 2.5 × tilt of the earth's axis relative to its orbital plane (23.45°)

Comparison as angular elongation

≈ 1.3 × maximum elongation of Venus (45 to 47°)

Interpretations

plane angle

angular elongation

Basic unit dimensions

[angle]

Corresponding quantities

Rotation count N from $N = \varphi/(2\pi)$:

0.16 rot (rotations)

Slope percentage from [slope percentage] $= 100\% \times \tan(\theta)$:

162 slope% (slope percent)

Electric loss factor d from $\delta = \tan^{-1}(d)$:

1.62

Quality factor Q from $\delta d = \tan^{-1}(1/Q)$:

0.6172

$\tan^{-1}(x)$ is the inverse tangent function

1/2*(cos(51° 29’ – 6° 50’)-cos(51° 29’ + 6° 50’))

Input interpretation

$$\frac{1}{2}\,(\cos(51 \text{ degrees } 29 \text{ arcminutes} - 6 \text{ degrees } 50 \text{ arcminutes}) - \cos(51 \text{ degrees } 29 \text{ arcminutes} + 6 \text{ degrees } 50 \text{ arcminutes}))$$

Results

0.09309

0.09309

$\Delta = 13° 47'$; $m = (51° 29' - 6° 50')$; $n = (51° 29' + 6° 50')$

((51° 29’ – 6° 50’)-(13° 47’))

Input interpretation

(51 degrees 29 arcminutes – 6 degrees 50 arcminutes) – 13 degrees 47 arcminutes

Results

30 degrees 52 arcminutes

30.87° (degrees)

30.87°

((51° 29’ – 6° 50’)+(13° 47’))

Input interpretation

(51 degrees 29 arcminutes – 6 degrees 50 arcminutes) + 13 degrees 47 arcminutes

Results

58 degrees 26 arcminutes

58.43° (degrees)

58.43°

((51° 29’+6° 50’)-(13° 47’))

Input interpretation

(51 degrees 29 arcminutes + 6 degrees 50 arcminutes) – 13 degrees 47 arcminutes

Results

44 degrees 32 arcminutes

44.53° (degrees)

44.53°

((51° 29’+6° 50’)+(13° 47’))

Input interpretation

(51 degrees 29 arcminutes + 6 degrees 50 arcminutes) + 13 degrees 47 arcminutes

Results

72 degrees 6 arcminutes

72.1° (degrees)

72.1°

(30.87° + 58.43° + 44.53° + 72.1°)

Input interpretation

30.87° (degrees) + 58.43° (degrees) + 44.53° (degrees) + 72.1° (degrees)

Result

205.93° (degrees)

205.93°

Unit conversions

3.594 radians

1/2*(cos(51° 29’ – 6° 50’)-cos(51° 29’ + 6° 50’))

Input interpretation

$$\frac{1}{2}\,(\cos(51\text{ degrees }\ 29\text{ arcminutes} - 6\text{ degrees }\ 50\text{ arcminutes}) - \cos(51\text{ degrees }\ 29\text{ arcminutes} + 6\text{ degrees }\ 50\text{ arcminutes}))$$

Results

0.09309

0.09309

Thence:

30 degrees 52 arcminutes

58 degrees 26 arcminutes

44 degrees 32 arcminutes

72 degrees 6 arcminutes

we obtain:

1/2*(cos(51° 29’ – 6° 50’)-cos(51° 29’ + 6° 50’))+((30° 52’)+(58° 26’)+(44° 32’)+(72° 6’))

Input interpretation

$$\frac{1}{2}\,(\cos(51\text{ degrees }\ 29\text{ arcminutes} - 6\text{ degrees }\ 50\text{ arcminutes}) - \cos(51\text{ degrees }\ 29\text{ arcminutes} + 6\text{ degrees }\ 50\text{ arcminutes})) + (30\text{ degrees }\ 52\text{ arcminutes} + 58\text{ degrees }\ 26\text{ arcminutes} + 44\text{ degrees }\ 32\text{ arcminutes} + 72\text{ degrees }\ 6\text{ arcminutes})$$

Result

26' (arcminutes) + 32' (arcminutes) + 52' (arcminutes) + 6' (arcminutes) +
30° (degrees) + 44° (degrees) + 58° (degrees) + 72° (degrees) + 0.0930944

(26' + 32' + 52' + 6' + 30° + 44° + 58° + 72° + 0.0930944°)

Input interpretation

26' (arcminutes) + 32' (arcminutes) + 52' (arcminutes) +
6' (arcminutes) + 30° (degrees) + 44° (degrees) +
58° (degrees) + 72° (degrees) + 0.0930944° (degrees)

Results

12361.58566' (arcminutes)

12361.58566’

206.0264277° (degrees)

Unit conversions

3.59583951 radians

0.00359583951 krad (kiloradians)

---

206 degrees 1 arcminute 35.1398 arcseconds

13^{h} 44^{m} 6.34266^{s} (right ascension)

228.918253 grads
(unit officially deprecated)

Comparisons as plane angle

≈ 0.57 × full angle (2 π rad)

≈ 8.8 × tilt of the earth's axis relative to its orbital plane (23.45°)

Interpretations

plane angle

Basic unit dimensions

[angle]

Corresponding quantities

Rotation count N from $N = \varphi/(2\pi)$:

0.57 rot (rotations)

Electric loss factor d from $\delta = \tan^{-1}(d)$:

0.49

Quality factor Q from $\delta d = \tan^{-1}(1/Q)$:

2

$\tan^{-1}(x)$ is the inverse tangent function

From

12361.58566' (arcminutes)

we obtain:

0.989117352243+1/(12361.58566/4096)^(1/e)

Input interpretation

$$0.989117352243 + \frac{1}{\sqrt[e]{\frac{12\,361.58566}{4096}}}$$

Result

1.6551921405…

1.6551921405…. result very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3$ = 1164.2696 i.e. 1.6557845...

Alternative representation

$$0.9891173522430000 + \frac{1}{\sqrt[e]{\frac{12361.6}{4096}}} =$$

$$0.9891173522430000 + \frac{1}{\sqrt[\exp(z)]{\frac{12\,361.6}{4096}}} \quad \text{for } z = 1$$

Series representations

$$0.9891173522430000 + \frac{1}{\sqrt[e]{\frac{12361.6}{4096}}} = 0.9891173522430000 + 3.01797^{-\sum_{k=0}^{\infty}(-1)^k/k!}$$

$$0.9891173522430000 + \frac{1}{\sqrt[e]{\frac{12361.6}{4096}}} = 0.9891173522430000 + e^{-1.10458/\left(\sum_{k=0}^{\infty} \frac{1}{k!}\right)}$$

$$0.9891173522430000 + \frac{1}{\sqrt[e]{\frac{12361.6}{4096}}} =$$

$$0.9891173522430000 + 3.01797^{-z/\left(\sum_{k=0}^{\infty} \frac{-1+k+z}{k!}\right)}$$

$n!$ is the factorial function

Greenwich: $\varphi = 51°29'$; $\lambda = 0°$;
Roma CR; $\varphi_0 = 41°54'$; $\lambda_0 = 12°29'$;

$\lambda - \lambda_0 = \Delta = 12°29'$;
$\varphi - \varphi_0 = m = 9°35'$; $\cos m = 0{\cdot}9860445$
$\varphi + \varphi_0 = n = 93°23'$; $\cos n = -0{\cdot}0590160$

$\frac{1}{2}(\cos m - \cos n) = 0{\cdot}5225302$

$m - \Delta = -2°54'$; $\cos = 0{\cdot}9987194$
$m + \Delta = 22°4'$; $\cos = 0{\cdot}9267474$
$n - \Delta = 80°54'$; $\cos = 0{\cdot}1581581$
$n + \Delta = 105°52'$; $\cos = -0{\cdot}2733997$

$\Sigma = 1{\cdot}8102252$; $\frac{1}{4}\Sigma = 0{\cdot}4525563$

$\cos \alpha = 0{\cdot}9750865$
$\alpha = 12°49'$

44700 seconds = degrees

Input interpretation

convert 44700″ (arcseconds) to degrees

Results

12.42° (degrees)

12.42°

12 degrees 25 arcminutes

Additional conversions

216.7 mrad (milliradians)

0.2167 radians

---

49 m 40 s (right ascension)

13.8 grads
(unit officially deprecated)

0.138 quad (quadrants)

Comparisons as plane angle

≈ 0.53 × tilt of the earth's axis relative to its orbital plane (23.45°)

Visual representation for 12.42° (degrees)

Interpretations

plane angle

angular elongation

Basic unit dimensions

[angle]

Corresponding quantities

Arc length s along the Earth's equator from $s = R\theta$:

1382 km (kilometers)

1.382×10^6 meters

746.3 nmi (nautical miles)

858.9 miles

Arc length s around the Earth at 45° latitude from $s = R\cos(45°)\theta$:

977.4 km (kilometers)

977 375 meters

527.7 nmi (nautical miles)

607.3 miles

Rotation count N from $N = \varphi/(2\pi)$:

0.034 rot (rotations)

Slope percentage from [slope percentage] $= 100\% \times \tan(\theta)$:

22.02 slope% (slope percent)

Electric loss factor d from $\delta = \tan^{-1}(d)$:

0.2202

Quality factor Q from $\delta d = \tan^{-1}(1/Q)$:

4.542

$\tan^{-1}(x)$ is the inverse tangent function

(Δ = 13° 47’)

51° 29’ – 12° 25’ = m

51° 29’ + 12° 25’ = n

1/2*(cos(51° 29’ – 12° 25’)-cos(51° 29’ + 12° 25’)

1/4*((cos((51° 29’ – 12° 25’)-(13° 47’))+cos((51° 29’ – 12° 25’)+(13° 47’))+cos((51° 29’ + 12° 25’)-(13° 47))+ cos((51° 29’ + 12° 25’)+(13° 47))))

Input interpretation

$$\frac{1}{4}\Big(\cos((51\text{ degrees }\ 29\text{ arcminutes} - 12\text{ degrees }\ 25\text{ arcminutes}) - 13\text{ degrees }\ 47\text{ arcminutes}) + \cos((51\text{ degrees }\ 29\text{ arcminutes} - 12\text{ degrees }\ 25\text{ arcminutes}) + 13\text{ degrees }\ 47\text{ arcminutes}) + \cos\big((51\text{ degrees }\ 29\text{ arcminutes} + 12\text{ degrees }\ 25\text{ arcminutes}) - 13^\circ\ (\text{degrees}) \times 47\big) + \cos\big((51\text{ degrees }\ 29\text{ arcminutes} + 12\text{ degrees }\ 25\text{ arcminutes}) + 13^\circ\ (\text{degrees}) \times 47\big)\Big)$$

Result

0.3054

0.3054

1/2*(cos(51° 29’ – 12° 25’)-cos(51° 29’ + 12° 25’))+1/4*((cos((51° 29’ – 12° 25’)-(13° 47’))+cos((51° 29’ – 12° 25’)+(13° 47’))+cos((51° 29’ + 12° 25’)-(13° 47))+cos((51° 29’ + 12° 25’)+(13° 47))))

Input interpretation

$$\frac{1}{2}(\cos(51\text{ degrees }\ 29\text{ arcminutes} - 12\text{ degrees }\ 25\text{ arcminutes}) - \cos(51\text{ degrees }\ 29\text{ arcminutes} + 12\text{ degrees }\ 25\text{ arcminutes})) + \frac{1}{4}(\cos((51\text{ degrees }\ 29\text{ arcminutes} - 12\text{ degrees }\ 25\text{ arcminutes}) - 13\text{ degrees }\ 47\text{ arcminutes}) + \cos((51\text{ degrees }\ 29\text{ arcminutes} - 12\text{ degrees }\ 25\text{ arcminutes}) + 13\text{ degrees }\ 47\text{ arcminutes}) + \cos((51\text{ degrees }\ 29\text{ arcminutes} + 12\text{ degrees }\ 25\text{ arcminutes}) - 13^\circ\ (\text{degrees}) \times 47) + \cos((51\text{ degrees }\ 29\text{ arcminutes} + 12\text{ degrees }\ 25\text{ arcminutes}) + 13^\circ\ (\text{degrees}) \times 47))$$

Results

0.4736

0.4736

7/2*(1/2*(cos(51° 29’–12° 25’)-cos(51° 29’ + 12° 25’))+1/4*((cos((51° 29’–12° 25’)-(13° 47’))+cos((51° 29’ – 12° 25’)+(13° 47’))+cos((51° 29’ + 12° 25’)-(13° 47))+ cos((51° 29’ + 12° 25’)+(13° 47)))))

Input interpretation

$$\frac{7}{2}\left(\frac{1}{2}(\cos(51\text{ degrees }\ 29\text{ arcminutes} - 12\text{ degrees }\ 25\text{ arcminutes}) - \cos(51\text{ degrees }\ 29\text{ arcminutes} + 12\text{ degrees }\ 25\text{ arcminutes})) + \frac{1}{4}(\cos((51\text{ degrees }\ 29\text{ arcminutes} - 12\text{ degrees }\ 25\text{ arcminutes}) - 13\text{ degrees }\ 47\text{ arcminutes}) + \cos((51\text{ degrees }\ 29\text{ arcminutes} - 12\text{ degrees }\ 25\text{ arcminutes}) + 13\text{ degrees }\ 47\text{ arcminutes}) + \cos((51\text{ degrees }\ 29\text{ arcminutes} + 12\text{ degrees }\ 25\text{ arcminutes}) - 13^\circ\ (\text{degrees}) \times 47) + \cos((51\text{ degrees }\ 29\text{ arcminutes} + 12\text{ degrees }\ 25\text{ arcminutes}) + 13^\circ\ (\text{degrees}) \times 47))\right)$$

Results

1.658

1.658 ≈ result very near to the 14th root of the following Ramanujan’s class invariant $Q = (G_{505}/G_{101/5})^3$ = 1164.2696 i.e. 1.6557845...

And:

(2+√2)*(1/2*(cos(51° 29’–12° 25’)-cos(51° 29’+12° 25’))+1/4*((cos((51° 29’–12° 25’)-(13° 47’))+cos((51° 29’–12° 25’)+(13° 47’))+cos((51° 29’+12° 25’)-(13° 47))+ cos((51° 29’ + 12° 25’)+(13° 47)))))

Input interpretation

$$(2+\sqrt{2})\left(\frac{1}{2}(\cos(51\text{ degrees }\ 29\text{ arcminutes}-12\text{ degrees }\ 25\text{ arcminutes})-\cos(51\text{ degrees }\ 29\text{ arcminutes}+12\text{ degrees }\ 25\text{ arcminutes}))+\frac{1}{4}(\cos((51\text{ degrees }\ 29\text{ arcminutes}-12\text{ degrees }\ 25\text{ arcminutes})-13\text{ degrees }\ 47\text{ arcminutes})+\cos((51\text{ degrees }\ 29\text{ arcminutes}-12\text{ degrees }\ 25\text{ arcminutes})+13\text{ degrees }\ 47\text{ arcminutes})+\cos((51\text{ degrees }\ 29\text{ arcminutes}+12\text{ degrees }\ 25\text{ arcminutes})-13^\circ\ (\text{degrees})\times 47)+\cos((51\text{ degrees }\ 29\text{ arcminutes}+12\text{ degrees }\ 25\text{ arcminutes})+13^\circ\ (\text{degrees})\times 47))\right)$$

Results

1.617

1.617 result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Observations and conclusions

Electromagnetic phenomena accompany periods of earthquakes, and which at that time often take the place of telluric motions. In addition to this, they predominate every year during one or two months which chooses between March and May or, at the latest, enters June and July. **The activity of the sun is the center of electromagnetic phenomena** (Michele Stefano De Rossi – "Meteorologia Endogena")

Recall that tidal force (generally used in the plural, tidal forces or tidal forces, and also with the expression tidal effects) is a secondary effect of the **force of gravity**. Tidal effects from different bodies can add up, as in the case of the alignment between the Moon and the Sun which gives rise to intense syzygial tides.

The undoubted correlation that Prof. De Rossi felt between the Corleone earthquakes and those of Monte Baldo last year moved me to pay special attention to the latter as well. Rummaging through the scientific yearbooks, I found the precise dates of the strongest earthquakes felt in 1866 on the slopes of Monte Baldo, namely: 13 June, 11 August and 7-8 November, which correspond to the new moons; in 1870 seismic activity reawakened there, but I don't know the dates; in 1876 the first strong shock occurred on April 23, that is, on the eve of the new moon; with the perigee (which took place on the 26th) the shocks prepared by the new moon continued until the 29th; then the frequency decreased until May 4th and it already seemed to have left those populations in peace; except that the next coincidence of the new moon with the perigee and with a strong northern declination (in which position, as I already said, one of the two passages to the meridian is an energetic occasion for an earthquake) provided me with such a clue of awakening, probably on a greater extent of land , that here I prepared myself for careful surveillance, so as not to miss the most important phases of the phenomenon, when this happened. I mentioned this probability to Prof. Don Timoteo Bertelli of Florence in my letter of May 1st and to Prof. Goiran of Verona in a letter of the same 12th. The critical day otherwise passed peacefully in Trieste; not so in Monte Baldo, where the tremors resumed on the 22nd and continued on the 23rd, to be repeated on the 29th; at the same time in Corleone the activity, which had seemed almost extinguished since the 10th, was reawakened with a shock on the 20th, one on the 21st, four on the 24th and with great energy on the 25th. On May 22nd, the eve of the new moon, the very strong earthquake also occurred of Spoleto and at the time of the new moon in question there was, it can be said, no region of the Apennines in which seismic activity did not manifest itself with greater or lesser force, as can be seen from the bulletin.

In Monte Baldo there was a truce during June; in July the tremors resumed the day after the full moon and continued thereafter without interruption; in the following months tremors were noted on August 7th, September 5th, October 9th and November 4th, that is, almost always one or two days after the full moon. It is remarkable that on May 22nd and 23rd, while the rest of Italy was shaking, there was a truce in Corleone and then an immediate awakening, and the truce that occurred in the new moons following Monte Baldo in the face of energy is equally significant. manifested itself at the same time as Corleone, where the endogenous forces were transported by geological-mechanical effects, which it is not my task to erudite. In 1870, as far as I can remember, the seismic period of Monte Baldo put an end to that of Monte Nevoso (Julian Alps). This began on February 28th with a strong tremor at 12.20 pm; the next day the shocks were repeated and so also on the day of the new

moon, March 2, and the following; after a fifteen-day truce a shock was felt at the full moon; then there were other tremors, the dates of which I could not know; those that came to my attention, and were the strongest, occurred on April 28th (the eve of the new moon), on May 10th, on May 15th (full moon), on June 2nd (near the new moon) and several between the 13th and the 19th. June (full moon period). Then the activity died down there and arose in Monte Baldo. Monte Nevoso was frequently subject to earthquakes; in relatively recent times there was a long period from November 1750 to May 1753; and in 1838 the populations remained in suspense for three months. That local area includes the city of Rijeka; and even in the small earthquakes, which occur here from time to time, I have observed a decided prevalence of syzygies. From this we see that some seismic periods, although limited within very narrow boundaries, can be the effect of a large telluric cause. I took the Corleone period into special consideration, because this is one of the few whose phases have been carefully studied and from which there is a sufficiently large number of shocks to draw positive consequences. There was another seismic period of recent memory and well studied, that of Belluno; the existing relationship between it and the lunar positions has no need of my demonstrations, because the illustrious Falb proved it since he predicted, based on his theories, the return of the phenomenon even during the course of the period itself.

Perhaps all the seismic phenomena that occur in Italy have as their cause, if not direct, at least determining, the action of the stars, but while on the one hand the lack of sufficient observations does not allow very extensive studies, on the other hand the translocation, which often happens, seismic centers distract the attention of investigators so as not to allow them to glimpse the effects of a great common cause in isolated phenomena.
It is desirable that the invitation made repeatedly by Prof. Cav. De Rossi, in order to obtain the greatest possible number of reports on seismic phenomena, must be listened to by those who have the progress of science at heart and that no one abstains from communicating even crude observations of such phenomena, the memory of which without this could be lost to the detriment of science. (**DELL' ATTRAZIONE LUNI- SOLARE IN RELAZIONE COI FENOMENI MAREO – SISMICI** - STUDI DIMOSTRATIVI DI GIULIO GRABLOVITZ – 1877)

In conclusion:

While **the activity of the sun is the center of electromagnetic phenomena,** the tidal force, hence the luni-solar attraction, is a secondary effect of the **force of gravity**. The **aurora borealis**, for example, is a phenomenon visually characterized by luminous bands that take on a wide range of shapes and colours, rapidly changing in time and space, usually red-green-blue in colour, called auroral arcs, caused from the interaction of charged particles (protons and electrons) of solar origin (solar wind) with the terrestrial ionosphere (atmosphere between 100-500 km): these particles excite the atoms of the atmosphere which, subsequently de-energizing, emit light of various lengths 'wave. Solar activity is a source of emission of **electromagnetic waves** and **electrically charged particles**, the luni-solar attraction, is a secondary effect of the **force of gravity**. It is therefore possible to hypothesize a connection, albeit indirect, between these phenomena and "**gravitational waves**" which, among other things, travel at a speed equal to c (speed of light), as well as **electromagnetic waves**. Thus, there is a purely mathematical connection between seismic waves and gravitational waves.

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

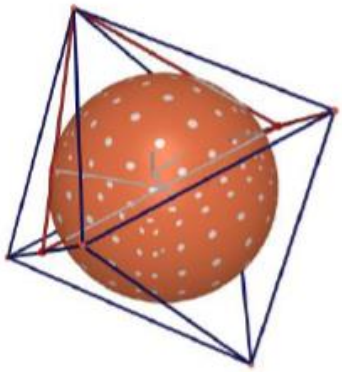


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\ z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\ x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\,l^3}{\frac{1}{3}\left(4\,\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\,\lfloor \arg(2-z_0)/(2\pi)\rfloor}\, z_0^{1/2\,(1+\lfloor \arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}\,C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.14193957152658430892433073219616263267751338681165904468254173 93

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi\,C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^{0}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{\left(2\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$
$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

6π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$6\pi\sqrt{2} \times \frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{\left(6\pi\sqrt{2}\right)\left(\sqrt{2}\,l^3\right)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

$4096 = 64^2$, (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$). The number 1728 is one less than the Hardy–Ramanujan

number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.61805\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+\right.$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$$\frac{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,8}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+\right.$$
$$27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^{\,8}\right)}{2\pi}\right\rfloor\right)\sqrt{x}$$
$$\left.\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^{\,8}\right)^k}{k!}\right) \text{ for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2(\sqrt{2}\ l^3)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$

$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^{\,8}-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^{\,8}-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^{\,8}-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi\, e^0 \approx 3.1416$ (real, principal root)

$\pi\, e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1 \sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003 \quad \text{(real, principal root)}$$

$$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003 \quad \text{(real root)}$$

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\pi \left\lfloor \frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\pi} \right\rfloor\right) \sqrt{x} \sum_{k=0}^{\infty} \frac{(-1)^k \left(\frac{8}{\pi^2}-x\right)^k x^{-k} \left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=$$

$$\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\ a^3\right)\left(\sqrt{2}\ d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\frac{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}{3\times3}}}} =$$

$$\sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.1415926535884871624221932509858715278931025189245576170078100613
…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2 \times \frac{2 \cdot \sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi \cdot 0.9991104684}(C \times \mathrm{R} \times 2.33 \cdot 10^{-13})}} \cong 1.61803398\ldots = \frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1} = 1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}} \approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.6180359123482642354401744088347098542545273508401733563064818107
…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\,x^2\,y\,z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\,dx\,dy\,dz = 12.9443\,L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\,dz\,dy\,dx = 6.77761\,R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals $(2\sqrt{2})/\pi$ is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

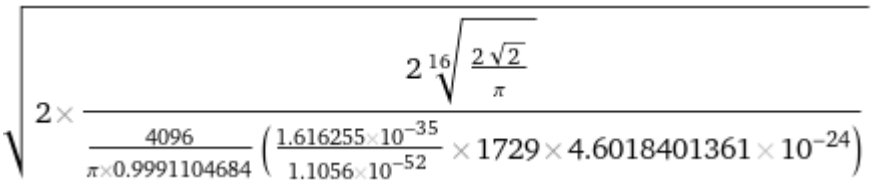
From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and $R = 4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...



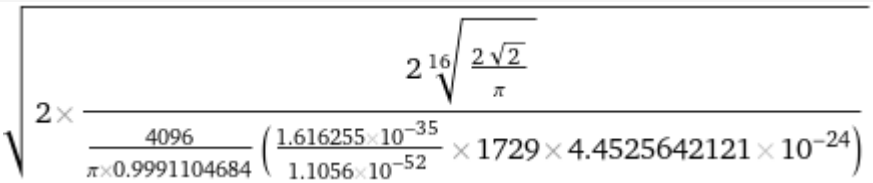
1.6180329973075324915067570166297467464225772608929671407919395903
…

1.6180329973075… result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation



Result

1.644932352102092130483898983704151168876621841655166877914166033 8
…

1.64493235210209213…≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times10^{-35}}{1.1056\times10^{-52}}\times 1729\times 1.2206935225\times 10^{-24}\right)}}$$

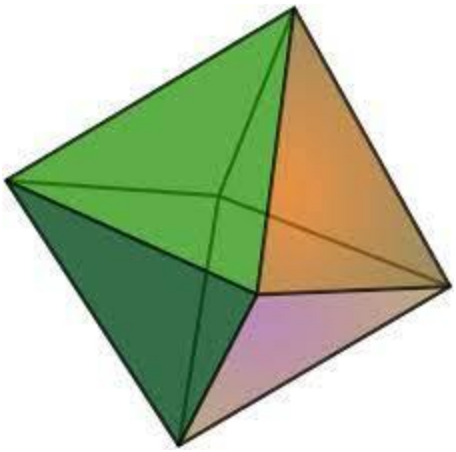
Result

3.14159225731469939939950039231605796469731171781644423955790024797

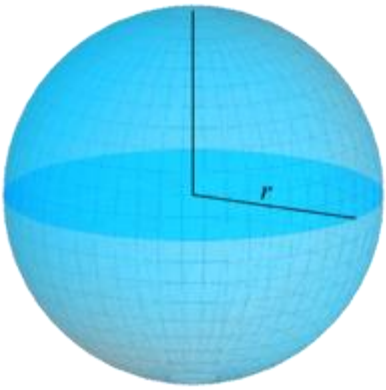
…

3.14159225731469…≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find a, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

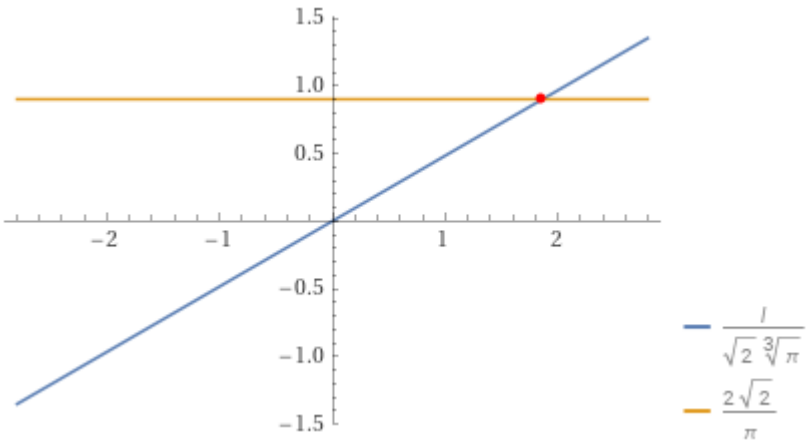
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{\left(2\sqrt{2}\right)^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8 \cdot \sqrt{2^3} \cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8 \cdot \sqrt{2 \cdot 2^2} \cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16 \cdot \sqrt{2} \cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32 \cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}};\ a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 =$$

$$\frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi =$$
$$\left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not}\ (z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

1.64381856858…. $\approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\wedge(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\wedge(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\wedge(1/15)\right)$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)}\quad \text{for } (0<\gamma<-\operatorname{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

–5.010882647757...

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\text{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $b=-\frac{226\,802\,245}{18\,480\,874}$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

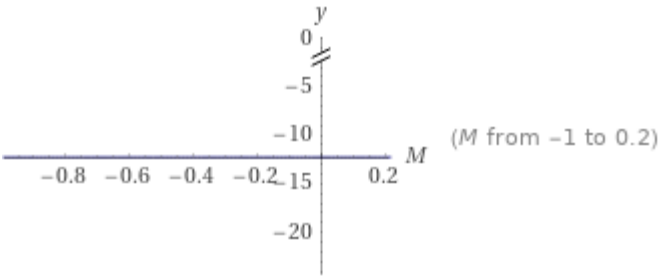
Input interpretation:

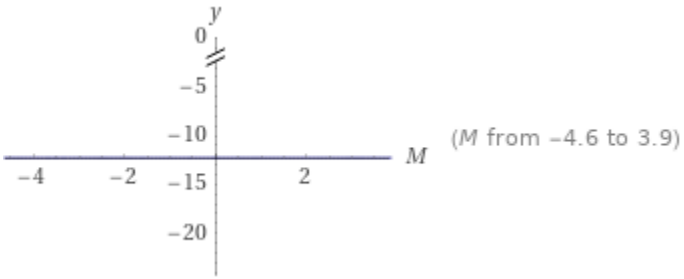
$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

Result:

$$\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:





Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}\ -12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}\ -0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int \frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM = \frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\} = -\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\} = -\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2} = -12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V=\frac{1}{3}\left(0.0814845\,b+1\right)^2M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

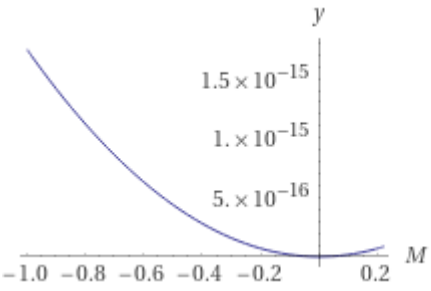
Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

Result:

0

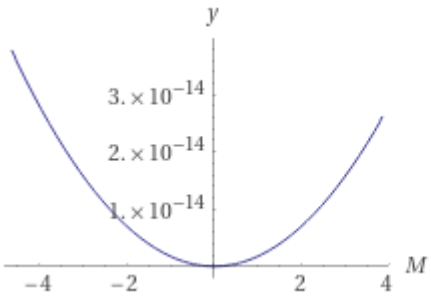
Plots: **(possible mathematical connection with an open string)**



(*M* from −1 to 0.2)

M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$$O\left(M^{62\,194}\right)$$

(Taylor series)

Series expansion at M = ∞:

$$1.75541\times10^{-15}\,M^2+O\left(\left(\frac{1}{M}\right)^{62\,194}\right)$$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{1}{3}\,M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\,\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\,\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2\left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^-16

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-17}$

$7.021621519159*10^{-17}$

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

$1.57986484181*10^{-14}$

For M = 2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times 2^2+6.58545\times 10^{-10}\sqrt{2^4}\right)}{2^2}+1\right)^2\times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times 10^{-15}$

7.021621519*10^-15

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times10^{-15}+1.57986484181\times10^{-14}+7.021621519\times10^{-17}-4.38851344947\times10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times10^{-8}$

$5.9776991059*10^{-8}$ result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_P^E=\mathbf{E}_P l_P^2=\phi_P l_P=\sqrt{\frac{\hbar c}{\varepsilon_0}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)]))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left(\left(1/\left(7.021621519\times10^{-15}+1.57986484181\times10^{-14}+7.021621519\times10^{-17}-4.38851344947\times10^{-16}\right)\right)\text{ ^ }(1/7)-\frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

5.729475 * 10^{-35} Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

1.820306 * 10^{61} V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

5.975498*10^{-8} V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

1.042940*10^{27} V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

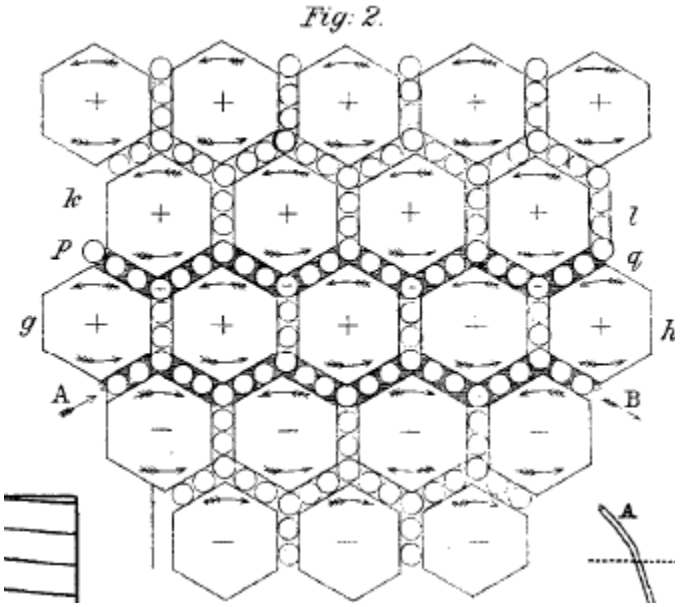
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

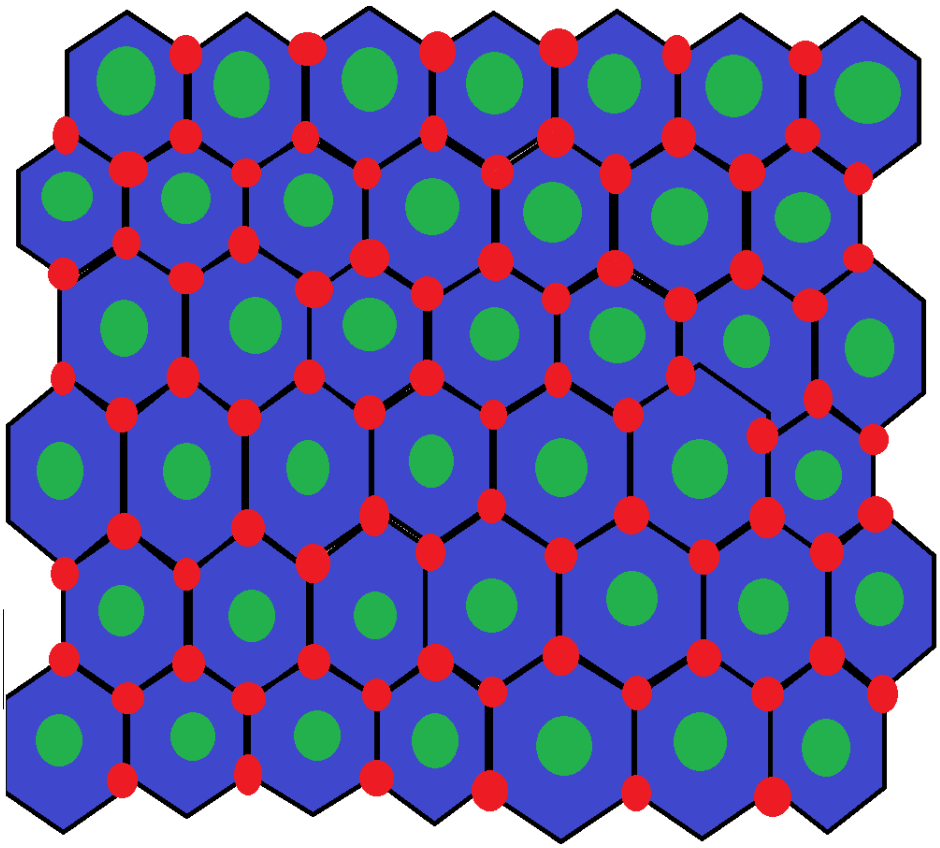
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

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See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf

On the study of various earthquakes, geophysical phenomena and related equations. New possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory III

Michele Nardelli[1], Antonio Nardelli

Abstract

In this paper, (part III) we analyze various earthquakes, geophysical phenomena and related equations. We obtain new possible mathematical connections with the Ramanujan Recurring Numbers, DN Constant and some parameters of Number Theory, Theoretical Cosmology and String Theory

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Prof. Giulio Grablovitz (1846-1928)

Geofisico, Astrofisico, Sismologo, Matematico

(per gentile concessione della nipote Sig.ra Annasofia Grablovitz)

Srinivasa Ramanujan

(1887 - 1920)

Introduction

In this paper, an octahedron could serve as a mathematical or conceptual model of the universe in the quantic phase, while the spherical surface could be used to describe the geometry of the bubble-universe.

The values $(2\sqrt{2})/\pi$, the golden ratio φ, $\zeta(2)$ and π, can be connected to the proposed cosmological model. Here's how they might be connected:

Ratio $(2\sqrt{2})/\pi$ the so called DN Constant:

This relationship may have a connection with the geometric properties of the octahedron and the sphere, which have been considered as mathematical models of the early universe and bubbles universe in eternal inflation.

Golden Ratio φ:

The golden ratio is a mathematical constant that appears in many natural and artistic contexts and is often associated with harmonious proportions and aesthetic beauty. Its emergence in this context could suggest a kind of intrinsic symmetry or harmony in the structure of the early universe and bubbles universe.

Value of π:

The value of π is a fundamental mathematical constant that appears in many geometric formulas and relationships, including the geometry of the sphere. Its appearance could indicate a direct connection between the geometry of bubbles universe and the mathematical properties of spherical surfaces.

Ultimately, the results obtained can be interpreted as manifestations of the geometric and mathematical properties of the models proposed for the early universe and universe bubbles. This suggests that there is a profound connection between geometry, mathematics and cosmological physics, and that through the analysis of these relationships we can deepen our understanding of the universe and its fundamental phenomena.

The above values $(2\sqrt{2})/\pi$, the golden ratio φ and π, can be connected to the proposed cosmological model. This hypothesis is certainly plausible.

The various mathematical solutions and relationships can be seen as representations of the principles and laws that govern the formation and evolution of the universe.

Regarding the fundamental mathematical values, they could emerge as a consequence of the geometric and physical laws that govern the structure and evolution of the quantum universe and bubbles universe.

The multidisciplinary approach involving complex mathematical solutions and cosmological concepts can offer deeper insight into the fundamental nature of the universe and its processes. Exploring these connections could lead to new discoveries and insights into our understanding of the early universe and its complexity.

Proposal:

The initial octahedron: Let's imagine a regular octahedron, with perfectly symmetrical faces. Each face represents an ideal symmetry.

The emerging sphere: Inside the octahedron, there is an inscribed sphere. This sphere represents the bubble of the universe that emerges from the perturbations of the quantum vacuum during eternal inflation.

Expansion and transitions: As time passes, the universe expands. The faces of the octahedron begin to break, symbolizing "symmetry breaks." The sphere continues to grow, representing the expanding universe.

Constants and numbers: We integrate the mathematical results you obtained. For example, the golden ratio (φ) could be represented by a proportion between the dimensions of the octahedron and the sphere.

Entropy and complexity: Entropy increases as the universe evolves. We can represent this with a disordered growth of structures within the emerging sphere. Imagine this scene as an abstract work of art, where geometric shapes and cosmological concepts merge

In Fig.1 and Fig.2 let's imagine a regular octahedron representing the universe in its phase of high symmetry and very low entropy. Inside the octahedron we have an inscribed sphere that emerges from perturbations of the quantum vacuum during eternal inflation. As time passes, the universe expands, the faces of the octahedron break (symmetry breaks), and entropy increases. Spheres emerge from the octahedra, symbolizing the transition phases from a regime of very low entropy to a universe in which, with the passage of time, entropy increases, increasing the complexity of the universe itself.

Fig. 1

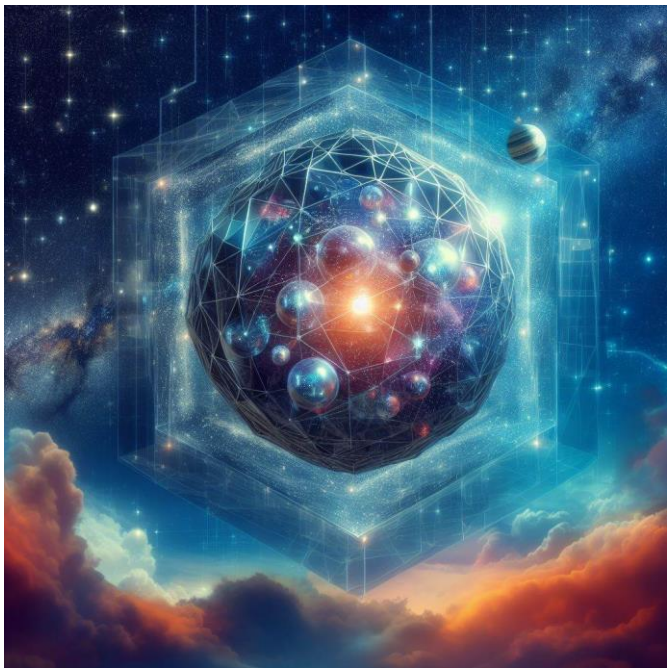
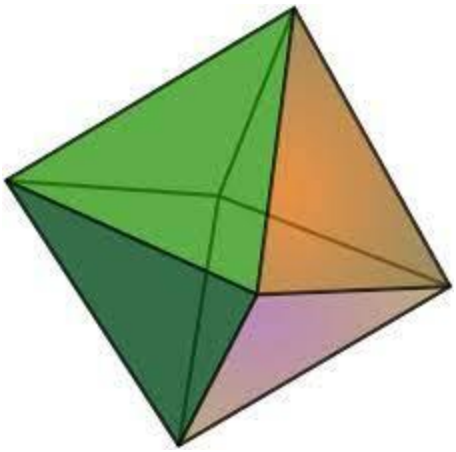
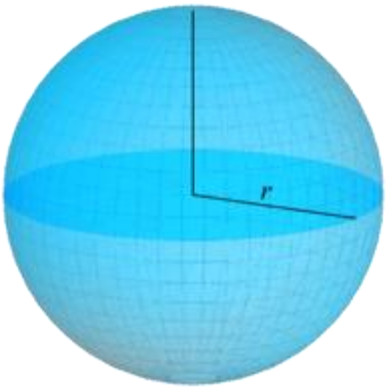


Fig. 2

Now, we have that:



Octahedron



Sphere

From the octahedron volume V = 1/3*√2 l^3 and, from the sphere volume,

V = (4/3*π*r^3) , we consider the following relationship, for r = x:

4/3*π*x^3 = 1/3*√2*l^3

Input

$$\frac{4}{3}\pi x^3 = \frac{1}{3}\sqrt{2}\, l^3$$

Exact result

$$\frac{4\pi x^3}{3} = \frac{\sqrt{2}\, l^3}{3}$$

Alternate forms

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$\frac{4\,\pi\,x^3}{3} - \frac{\sqrt{2}\,l^3}{3} = 0$$

Real solution

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Solutions

$$x = -\frac{\sqrt[3]{-\frac{1}{\pi}}\,l}{\sqrt{2}}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

$$x = \frac{(-1)^{2/3}\,l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

Integer solution

$$l = 0\,, \quad x = 0$$

Implicit derivatives

$$\frac{\partial x(l)}{\partial l} = \frac{l^2}{2\sqrt{2}\,\pi\,x^2}$$

$$\frac{\partial l(x)}{\partial x} = \frac{2\sqrt{2}\,\pi\,x^2}{l^2}$$

From the alternate form

$$x^3 = \frac{l^3}{2\sqrt{2}\,\pi}$$

$$x = \frac{l}{\sqrt{2}\,\sqrt[3]{\pi}}$$

for l = 8, we have that:

8/(sqrt(2) π^(1/3)) = 8/(2sqrt2 * Pi)^1/3

Input

$$\frac{8}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{8}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Result

True

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(8) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Thence:

l/(sqrt(2) π^(1/3)) = l/(2sqrt2 * Pi)^1/3

Input

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}}$$

Logarithmic form

$$\log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt{2}\,\sqrt[3]{\pi}\right) = \log_{\sqrt{2}\,\sqrt[3]{\pi}}(l) - \log_{\sqrt{2}\,\sqrt[3]{\pi}}\left(\sqrt[3]{2\sqrt{2}\,\pi}\right)$$

$\log_b(x)$ is the base- b logarithm

Now, we have that:

l/(2 sqrt(2) π)^(1/3) = (2sqrt2)/Pi

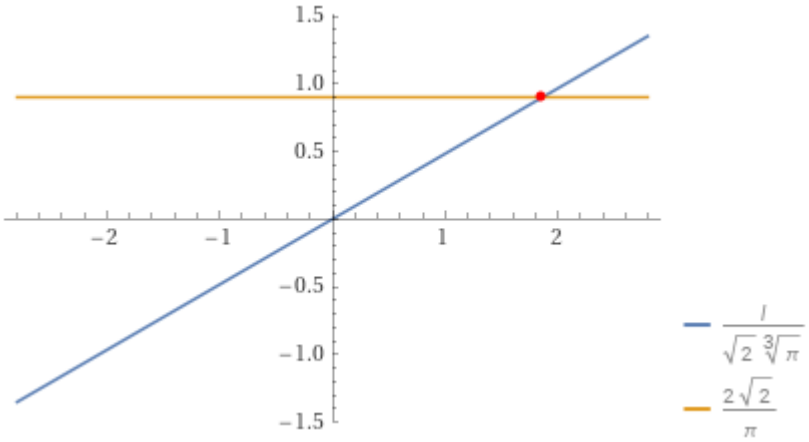
Input

$$\frac{l}{\sqrt[3]{2\sqrt{2}\,\pi}} = \frac{2\sqrt{2}}{\pi}$$

Exact result

$$\frac{l}{\sqrt{2}\,\sqrt[3]{\pi}} = \frac{2\sqrt{2}}{\pi}$$

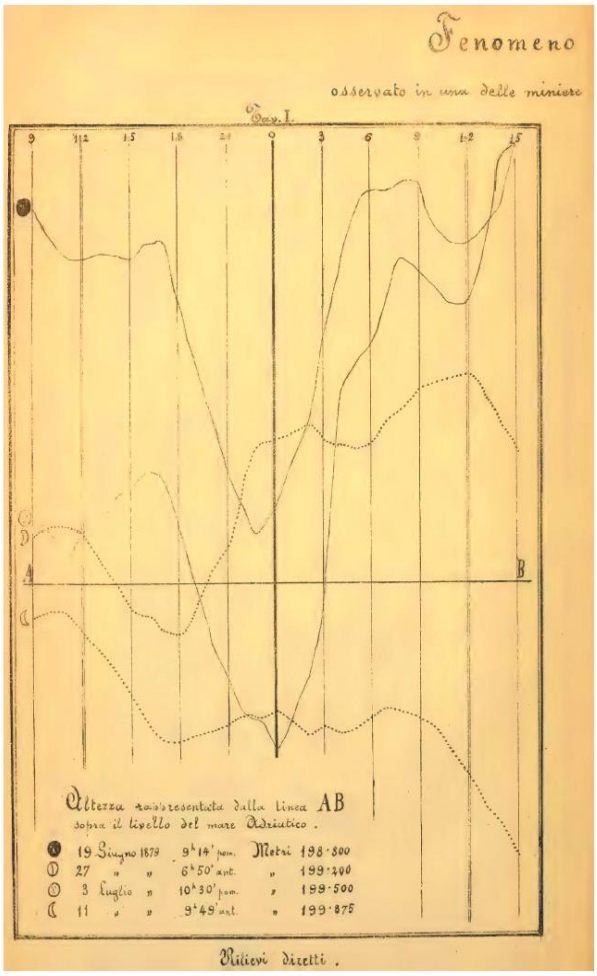
Plot

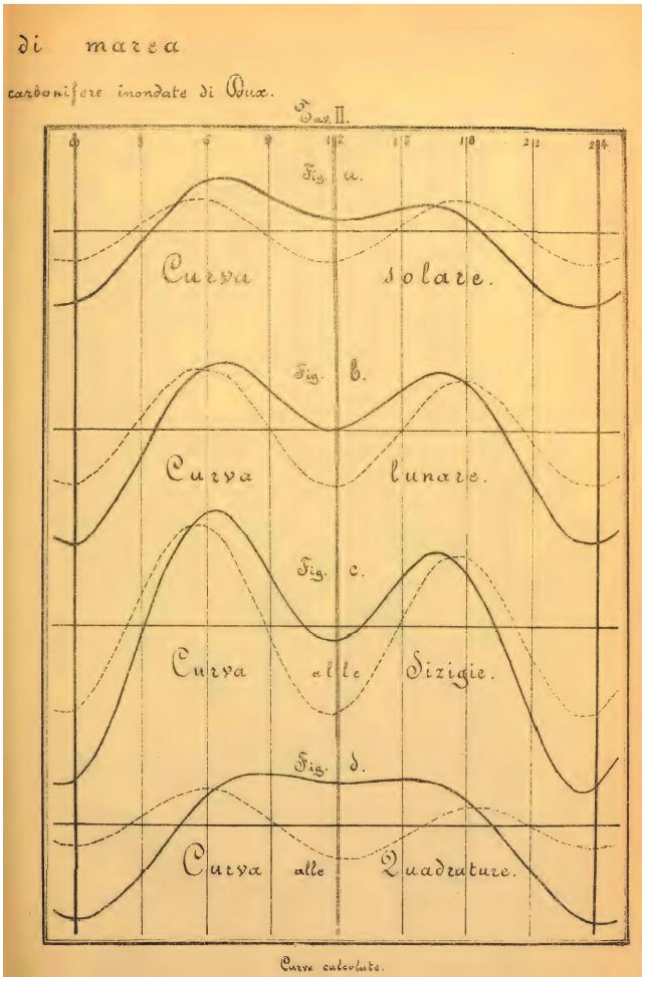


Solution

$$l = \frac{4}{\pi^{2/3}}$$

$$l = \frac{4}{\sqrt[3]{\pi^2}}$$


Fenomeno
osservato in una delle miniere
Tav. I.
A
B
Altezza rappresentata dalla linea AB
sopra il livello del mare Adriatico.
19 Giugno 1879 9h 14' pom. Metri 198·500
27 " " 6h 50' ant. " 199·200
3 Luglio " 10h 30' pom. " 199·500
11 " " 9h 49' ant. " 199·875
Rilievi diretti.

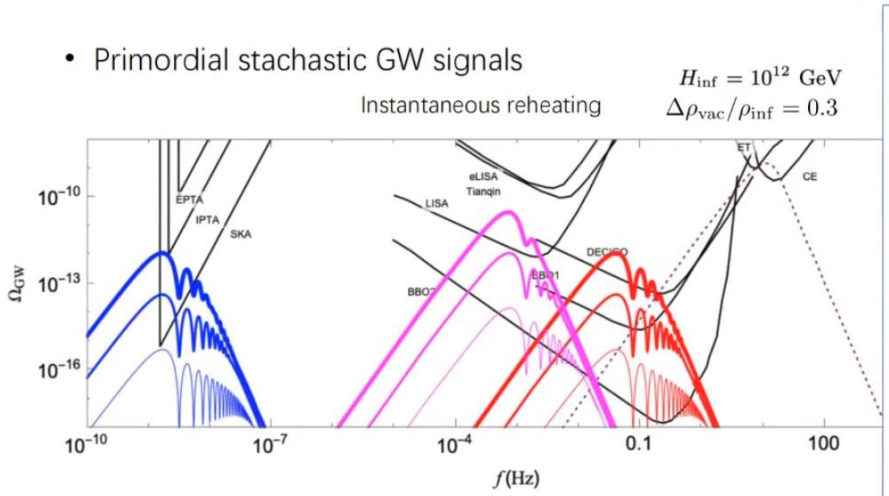

di marea
carbonifere inondate di Pux.
Tav. II.
Fig. a.
Curva solare.
Fig. b.
Curva lunare.
Fig. c.
Curva alle Sizigie.
Fig. d.
Curva alle Quadrature.
Curve calcolate.

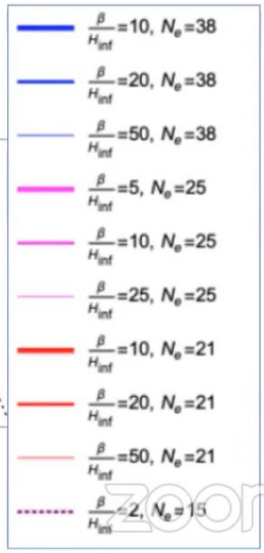
First-order phase transition during inflation

- Primordial stachastic GW signals

$H_{\rm inf} = 10^{12}$ GeV
$\Delta\rho_{\rm vac}/\rho_{\rm inf} = 0.3$

Instantaneous reheating





HA, Kun-Feng Lyu, Lian-Tao Wang, Siyi Zhou, 2009.12381, 2201.05171

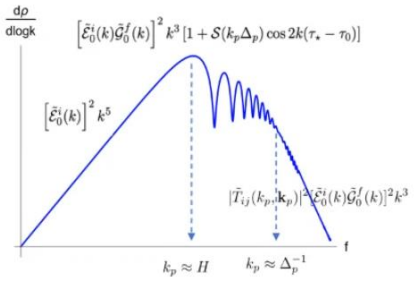
Comparison between primary GW and secondary GW

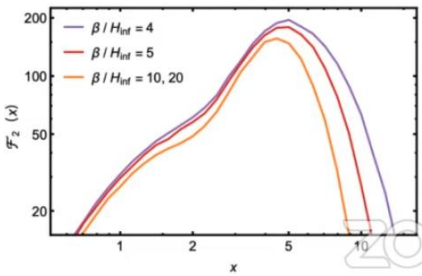
- Primary

$$\Omega_{\rm GW} \approx \Omega_R \left(\frac{H_{\rm inf}}{\beta}\right)^5 \left(\frac{\Delta\rho_{\rm vac}}{\rho_{\rm inf}}\right)^2$$

- Secondary

$$\Omega_{\rm GW} \sim \Omega_R \left(\frac{\mathcal{A}}{\epsilon}\right)^2 \left(\frac{M_{\rm pl}}{\phi_0}\right)^4 \left(\frac{H_{\rm inf}}{\beta}\right)^6 \left(\frac{\Delta\rho}{\rho_{\rm inf}}\right)^4$$





Observations on some seismic events 1873, 1878, 1880-1881 and 1885

Observations on the Earthquake of March 12, 1873 in Central Italy

Ragusa (Dalmazia) – Salisburgo – Aosta - Cosenza

Il fenomeno è passato. Ma quale ne fu la causa, quali le leggi, quali i precedenti, quali le conseguenze, quale l' ordine delle scosse, quali le influenze sugli animali? E poichè una scienza dei terremoti digià esiste, trova essa la scienza sismologica nel terremoto del 12 marzo 1873 nessun fenomeno che disveli nuove leggi o nuove qualità delle forze interiori del nostro pianeta, o che porti a sospettare nuove reciproche influenze tra le forze interne e le esterne atmosferiche o cosmiche? Quanti problemi in un solo fenomeno! Di tutti cercheremo la soluzione certa o probabile.

Adunque dove scoppiò la gran mina che la sera del 12 Marzo fe' traballare l' immenso quadrilatero che ha per suoi vertici Ragusa, Salisburgo, Aosta, Cosenza? E se non fu un' esplosione vulcanica nelle viscere del globo, ma piuttosto una bufera o marea d' irrequieti vapori o bollenti lave (terribili furie che abitano l' interno del nostro pianeta), dove percosse in prima quella bufera o marea?

On the Central Italy earthquake of 03.12.1873

« Sono circa le 9 di sera del giorno 12 marzo; un rombo si sente romoreggiare non sotterra, ma piuttosto per l'aria. Quest'urlo precursore fu sentito in qualche luogo anche dall'interno delle case, ma meglio e più forte fu avvertito nella campagna... Ché cosa è che lo produce? di dove viene? di sotterra od è nell'aria? A ciò il dotto P. Serpieri non risponde; e pensa che fosse nell'aria libera... Possiamo ammettere quale assioma, che il rombo, quando rombo v'è, è solito preannunciare l'arrivo imminente di un terremoto e talvolta si sente anche quando ha fatta la sua strage. »

« Questo rumore non era ancora cessato, che ad un tratto, appena battute le 9 di sera, una forte scossa smuoveva tutta quanta l'Italia da Cosenza a Belluno. Dove nacque quel terremoto? Come si estese? Ecco i quesiti a cui egregiamente rispose il chiarissimo P. Serpieri nel suo rapporto

penisola, e quindi venuta di fuori. Egli osserva inoltre che questa stessa onda si è spinta molto innanzi a tramontana ed a mezzogiorno, cioè ad Aosta e Cosenza; mentre il moto perpendicolare al primo corse verso le due spiagge marine, ma non discese e non salì molto nelle latitudini e con una bella figura rappresenta il terremoto come un grande e precipitoso fiume che ha corso da Cosenza ad Aosta o viceversa, e in mille punti ha rotto gli argini spingendosi con forti correnti a destra ed a sinistra ».

« Dalle notizie dall'egregio professore raccolte anzitutto appare che i moti geosismici hanno cominciato a manifestarsi sulla riva orientale dell'Adriatico, e che l'ora media del terremoto da Ragusa a Venezia (tempo di Roma) fu 9 ore 3′ 1/5, mentre le stazioni della penisola, tranne alcune centrali da Firenze a Spoleto hanno tutte un'ora superiore alle 9 ore 4′; ed inoltre i tempi vanno via alzandosi col crescere della latitudine. Difatti l'ora media in cui il terremoto si è fatto sentire nelle località seguenti, distanti l'una dall'altra circa un grado di latitudine è stata per

Ragusa-Sebenico	lat. med.	43°	19	ore	9, 0′ 2/5
Zara-Pola	»	44°	29	»	9, 2′ 1/5
Pisino-Trieste	»	45°	25	»	9, 5′ 3/10

« La progressione, scrive quindi il P. Serpieri, viene anche troppo bella e parlante. In poco più che 2′ le onde passarono dal grado 43 al 44 e nell'istesso tempo corsero dal grado 44 al 45. »

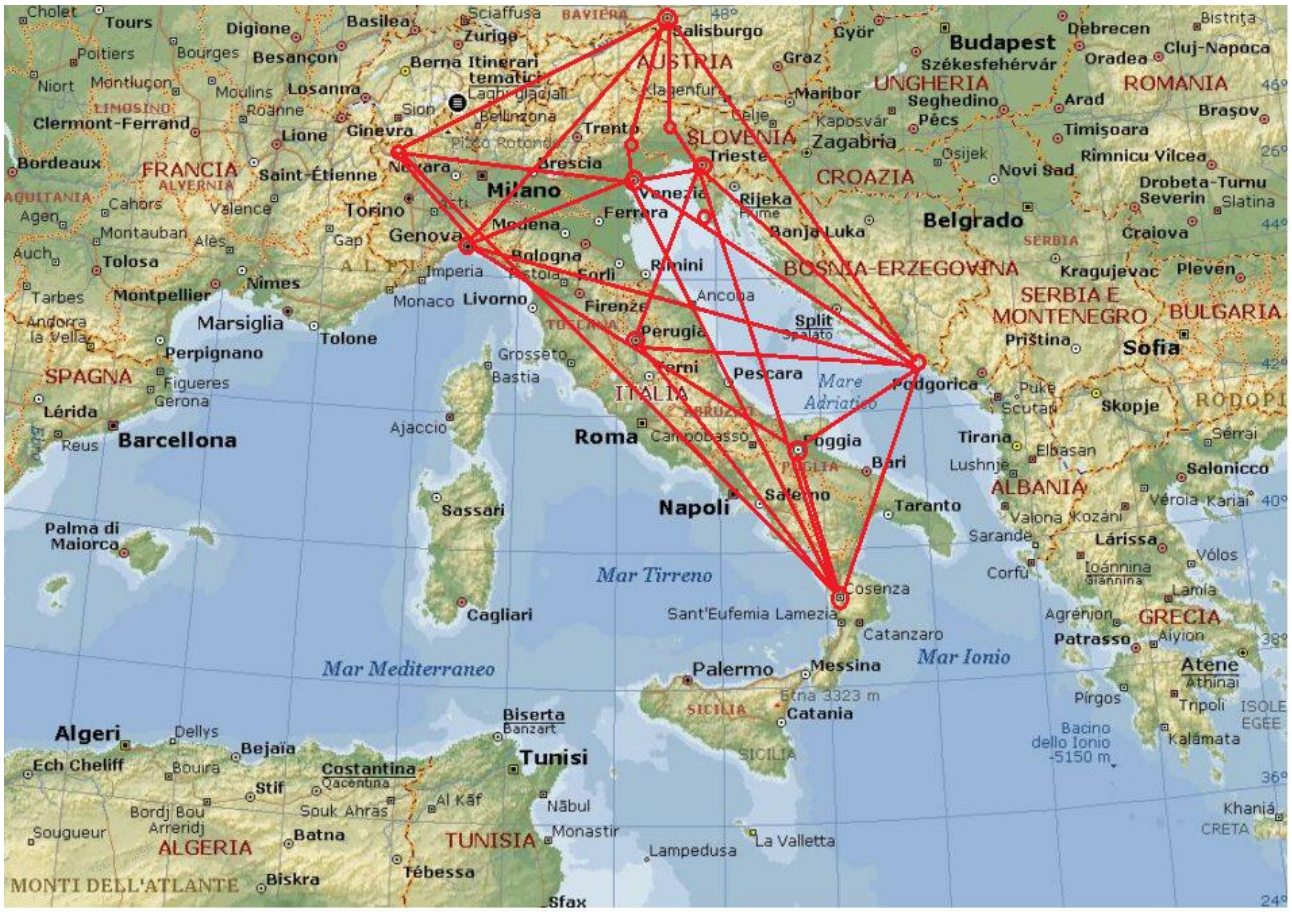
« Se si considera che le prime scosse si fecero sentire a Ragusa a ore 8.56 ½, a Cosenza, a Todi, a Foligno, a Zara alle ore 9, a Perugia alle ore 9 1', a Firenze a ore 9 3' 5/6, mentre nel resto d'Italia si manifestarono ad ora più tarda e nella valle della Salza l'ondulazione apparve a ore 9 22' ½, subito si ravvisa che il movimento nacque realmente verso il centro della Penisola. « Alle origini del Tevere da Fi-

le cento braccia a scuotere con moto convulso ambedue i lidi da Foggia a Venezia, da Cosenza a Genova, e le lontane creste delle Alpi. A tanta potenza e vastità di origine non poteva non corrispondere largo, lontanissimo effetto. »

« Prendendo di mira le stazioni di Ragusa e Venezia, e poi quelle di Spoleto e Venezia, egli calcolò la distanza sopra un arco di circolo massimo della terra, ed ebbe per le prime due 299 miglia o 554 chilometri, e per le seconde 209 miglia o 387 chilometri. La prima distanza percorsa in

« Le altre freccie laterali pure azzurre, segnano le linee d'irraggiamento, e queste, confermando il principio generale, rappresentano veramente i fatti parziali. In un colpo d'occhio si vede come la stessa scossa siasi fatta sentire a Cosenza e ad Aosta, e la freccia lassù sopra Udine, segna la scossa che probabilmente per quella direzione andò fino a Salisburgo e si fece sentire a ore 9, 22′ ½ tempo di Roma. »

« Infine nell'Adriatico abbiamo fatto un fascio di freccie con a fianco un punto interrogativo, volendo con questo segnale indicare il supposto punto di provenienza della corrente sdoppiatasi verso l'Italia e verso Dalmazia. »



Salisburgo - Ragusa (Dalmazia) – Aosta – Belluno - Udine – Venezia – Trieste - Pola – Genova – Perugia - Foggia – Cosenza

We note therefore that the earthquake in central Italy of March 12, 1873 was felt from the South (Cosenza, Calabria) to the North (Udine, Friuli-Venezia Giulia) of our peninsula, up to Austria (Salzburg)

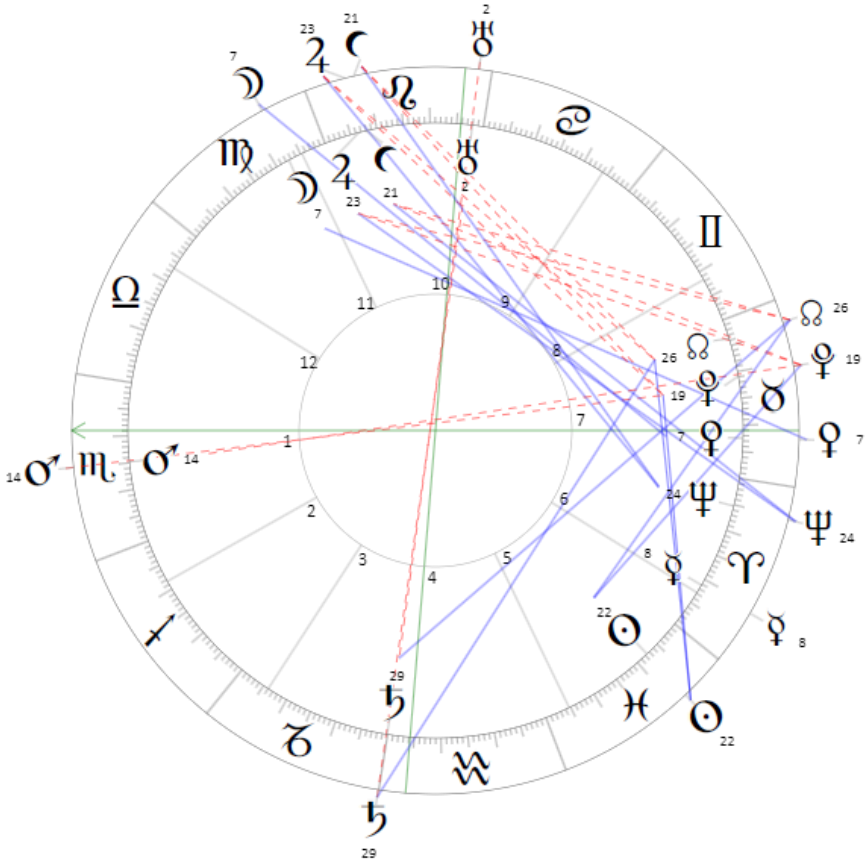
Friday, March 14, 1873 05:44:38 Full Moon 23°44'34 403 114.74 km

March 19, 1873 earthquake 7.3 R S. Salvador

March 14, 1873 05:44:38 Full Moon 23°44'34 403114.74 km

March 21, 1873 22:19:38 Last quarter 01°22'57 375835.01 km

Transit sky of Wednesday **12 March 1873** at 21:04:00, Rome, Italy



Nodo lunare – Plutone – Venere – Nettuno – Sole – Mercurio – Saturno – Luna – Giove – Luna – Urano – Marte

Giove-Nettuno; Nettuno-Luna; Saturno-Urano; Luna-Giove-Venere-Nettuno

02/02/1878	9.29	Eclisse anulare.	Meridionale	7.22	17.26

27 January 1880 10:12:16 Full Moon 06°54'44 392030.34 km

Regarding the earthquake of 01.26.1878, we have that:

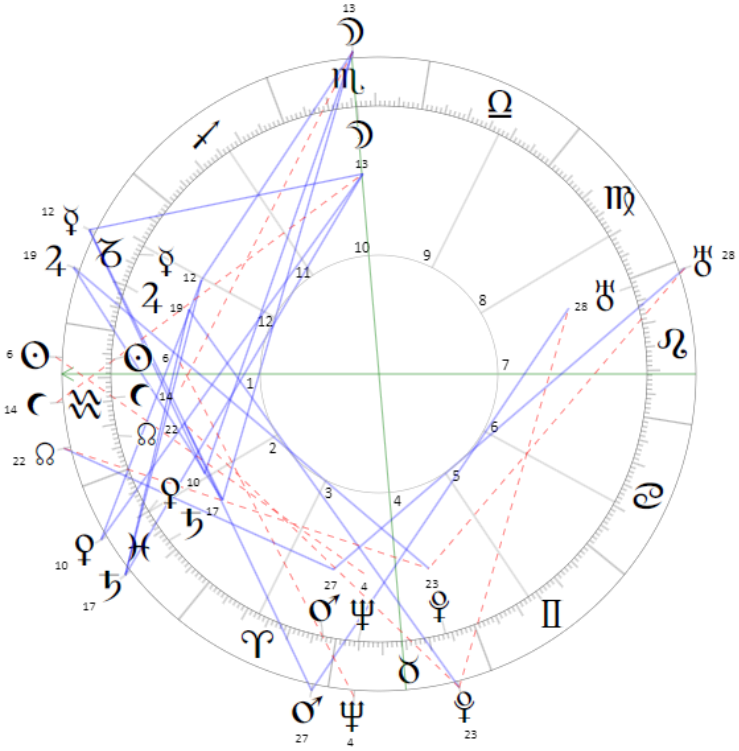
Nel giorno 26 gennaio 1878, alle ore 6, 25 ant. fu avvertito a Lisbona un terremoto preceduto da rombo sotterraneo. La scossa ebbe due impulsi successivi con oscillazioni da E ad O. Durò circa tre secondi. Non furono osservati spostamenti di mobili, ma la maggior parte degli abitanti avvertirono uno scricchiolio nelle impalcature. Ciò av-

Lunedì 28 gennaio 1878, leggere scosse furono avvertite a Rouen, Havre, Caen e lungo tutto il littorale della Manica. Il fenomeno fu sentito anche a Tarbes negli Alti Pirenei, e a Thionville nell'Alsazia.

A Caen il terremoto fu debolmente sentito verso le 11, 45′ a. m. nella direzione di E-O, sola direzione che potè disturbare un orologio a pendolo ed arrestarne il moto. Niun danno ne è avvenuto: tremarono i vetri e i quadri sospesi, ed un provino posato verticalmente cadde rovesciato. È la terza volta che questo fenomeno si fa sentire da 25 anni. Il primo avvenne violentissimo verso il 1859, e il secondo dodici anni fa.

Ho letto quest'oggi col più vivo interesse le notizie che Ella ha pubblicato sui terremoti del 26 e 28 Gennaio, che han scosso il Portogallo, la Francia e l'Inghilterra. Son lieto di farle conoscere, che anche in Italia abbiamo avuto nello stesso periodo un massimo straordinario nelle nostre osservazioni microsismiche; il quale massimo, secondo la legge divenuta già quasi costante, precede i veri sensibili terremoti. Difatti il 25 e il 26 la grande burrasca atmosferica è stata accompagnata qui in Italia da piccole scosse; e queste appunto hanno preceduto il terremoto, che si è manifestato due giorni dopo nella Manica; mentre l'Italia era allora tornata nella più completa tranquillità.

Transit sky of Saturday 26 January 1878 at 06:25:00, Rome, Italy



Luna – Venere; Luna – Giove ; Mercutio – Marte;

09.01.1878 Earth-Sun-Jupiter Conjunction

January 25, 1878 15:49:41 Last quarter 05°36'35 376140.57 km

February 2, 1878 08:17:15 New Moon 13°24'54 403046.19 km

Regarding the eclipses of 1880, we have:

11/01/1880	23.36	Eclisse totale.	Settentrionale	7.37	16.59
07/07/1880	14.10	Eclisse anulare.	Meridionale	4.42	19.47
02/12/1880	4.13	Eclisse parziale. Magnitud. = 0,03	Meridionale	7.20	16.40
31/12/1880	14.42	Eclisse parziale. Magnitud. = 0,71	Settentrionale	7.38	16.49

1880-07-04 08:20 Vallese, Embd

07/07/1880	14.10	Eclisse anulare.	Meridionale	4.42	19.47

7 July 1880 13:21:29 New Moon 15°43'26 404175.72 km

1880-12-01 10 Mistretta Mw = 4.16

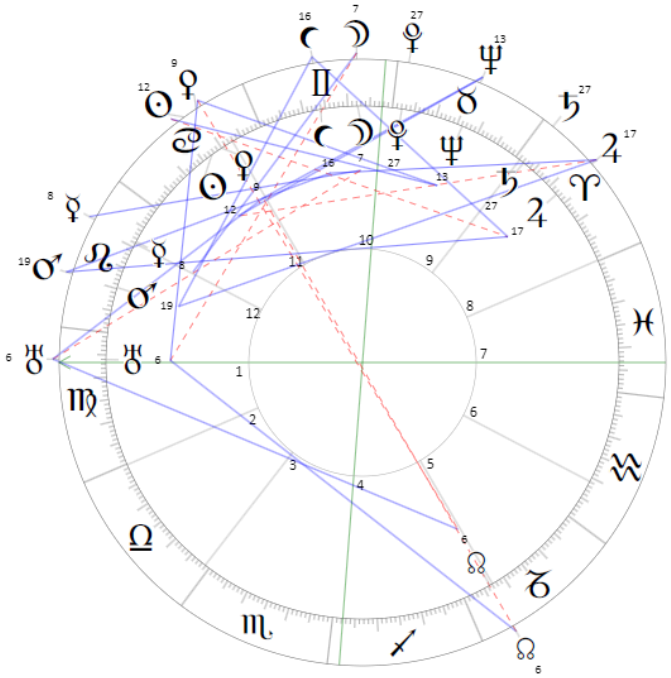
02/12/1880	4.13	Eclisse parziale. Magnitud. = 0,03	Meridionale	7.20	16.40

2 December 1880 02:56:37 New Moon 10°21'56 359428.83 km

(Perigee)

We also have that:

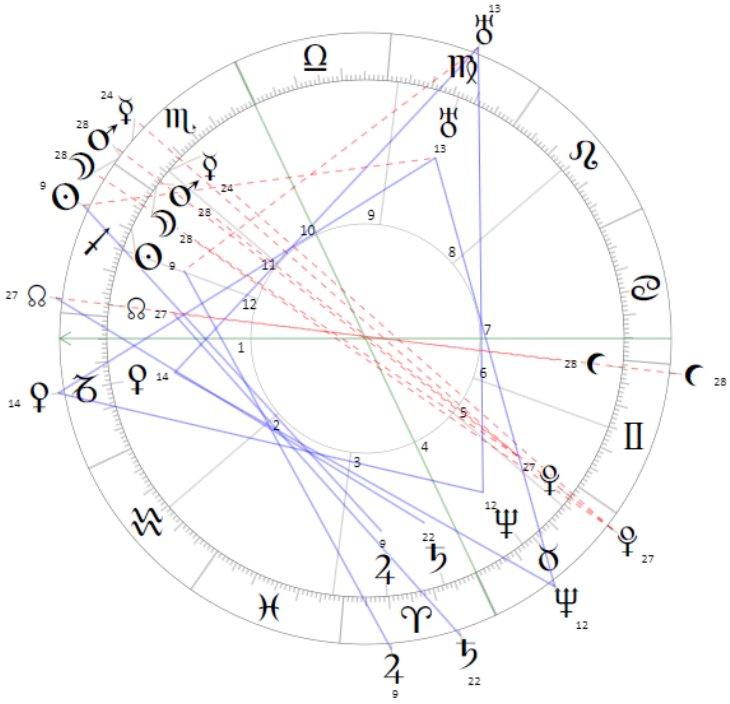
Transit sky of **Sunday 4 July 1880** at 08:20:00, Rome, Italy



Urano-Nettuno; Marte-Nettuno; Urano-Luna; Mercurio-Giove; Nettuno-Luna

Urano-Nettuno-Luna

Transit sky of **Wednesday 1 December 1880** at 08:20:00, Rome, Italy



Luna-Marte-Mercurio -- Plutone

Urano-Nettuno; Urano-Venere; Sole – Giove ; Sole-Saturno;

Sole-Giove-Saturno

28/05/1881	0.51	Eclisse parziale. Magnitud. = 0,73	Settentrionale	4.39	19.35

21/11/1881	17.27	Eclisse anulare.	Meridionale	7.07	16.45

1881-01-24 16:14	Bolognese

30 January 1881 00:48:23 New Moon 10°19'44 359023.06 km

1881-02-12 02:30 Etna - Codavolpe (S. Venerina)

14 February 1881 06:23:54 Full Moon 25°45'08 400516.98 km

1881-03-04 12:05 Casamicciola

28 February 1881 11:32:36 New Moon 10°03'30 365797.97 km

1881-04-23 04:12 Paola

28 April 1881 10:24:45 New Moon 08°14'36 386678.20 km

1881-06-09 Basso Vallese

12 June 1881 06:56:47 Full Moon 21°23'25 362063.98 km

1881-07-22	02:45	Belledonne-Pelvoux

26 Jul 1881 05:19:21 New Moon 03°18'15 406581.25 km

1881-08-03	14:42	Alessandrino
1881-08-05		Belledonne-Pelvoux

9 August 1881 21:07:07 Full Moon 17°20'25 357400.90 km

1881-09-10	07	Chietino

8 September 1881 04:39:47 Full Moon 15°38'25 361473.12 km

1881-09-21	21:20	Tarentaise (Moutiers)
1881-09-28		Cesena
1881-11-05	08:42	Carinthia, Gmuend
1881-11-14	02:55	Montreux
1881-11-25	17:25	Vaud, Aigle
1881-12-04	04:27	Sion

1881-12-17	05:14	Bex
1881-12-28	02	St. Moritz

September 23, 1881	11:54:48	New Moon	00°34'30	397300.47 km
November 6, 1881	02:03:17	Full Moon	13°49'52	380012.05 km
November 13, 1881	23:01:27	Last quarter	21°45'01	404240.24 km
November 21, 1881	16:21:36	New Moon	29°32'50	375651.69 km
December 5, 1881	17:13:56	Full Moon	13°46'23	391336.87 km
January 4, 1882	10:58:48	Full Moon	14°03'17	400790.06 km

The Moon is the closest celestial body to the Earth. Its average distance is 384,400 km. During a lunation, the Earth-Moon distance varies by about 45 thousand km. Furthermore, the maximum (apogee) and minimum (perigee) distances do not remain constant but vary according to non-simple rules. There are many gravitational perturbations that influence the motion of our satellite, consequently it is difficult to predict the real measurements of the apogee and perigee. When the major axis of the lunar orbit is perpendicular to the Earth-Moon line, the difference between the perigee and the apogee is reduced. The minimum Earth-Moon distance will be reached on January 1, 2257 and the minimum on January 7, 2266.

Below are the main data relating to the Earth-Moon distances.

Average apogee 405503 Km

maximum 406720 Km

Average perigee 363296 Km

minimum 356371 Km

Even if it doesn't seem like it, the Earth and the Moon are a binary system, that is, they rotate around each other. The center of gravity of this system is 17 Km below the Earth's surfaces.

Microseismic observations – 1885 earthquakes

OSS. MICROSISM. 1885 Gennajo Decade I.	1	2	3	4	5	6	7	8	9	10	Media	N.d'Os.	Media mensile	N. d'Oss.
Spinea di Mestre	2.37	1.55	1.65	0.72	0.31	1.24	1.13	2.06	1.03	0.00	1.20	40		
Venezia	—	—	—	—	—	—	—	—	—	—	—	—		
Verona	0.09	0.74	0.53	0.97	0.80	0.97	1.06	1.33	0.59	0.97	0.80	46		
Piacenza	0.61	2.05	1.28	0.46	0.77	1.08	0.81	1.34	0.66	0.77	0.98	30		
Moncalieri	1.31	1.36	1.02	1.81	1.86	1.83	1.53	2.11	1.10	0.84	1.17	118		
Alessandria	0.68	2.00	1.32	0.53	0.65	1.08	0.86	1.15	0.55	0.43	0.92	48		
Parma	0.86	1.13	1.05	0.66	0.58	0.58	0.74	2.60	0.69	0.41	0.93	50		
Bologna-S. Luca	1.77	1.35	2.36	0.58	0.67	0.67	0.89	1.09	1.08	0.84	1.08	40		
Chiavari	0.17	2.60	4.44	0.37	0.00	0.49	0.14	1.76	0.37	0.09	0.74	78		
S. Gio: in Galilea	1.40	1.10	2.71	1.92	0.87	1.61	1.53	1.58	1.07	0.33	1.41	71		
Pesaro	6.05	6.47	9.57	2.67	1.68	6.83	5.77	4.62	8.80	0.42	5.18	60		
Firenze t. a.	0.93	2.89	4.19	1.83	1.63	2.43	1.00	3.80	0.73	0.47	1.99	66		
Firenze t. n.	0.81	0.77	1.27	0.71	0.47	0.67	0.55	2.06	0.32	0.50	0 81	66		
Livorno	—	—	—	—	—	—	—	—	—	—	—	—		
Fermo	2.21	2.30	5.68	3.46	6.47	7.63	4.17	2.13	4.37	0.00	3.84	20		
Perugia	1.78	1.78	2.97	2.07	1.18	2.37	2.52	1.48	1.18	0.59	1.79	40		
M. Fortino	4.29	2.87	0.00	2.87	5.74	1.92	1.43	0.00	0.00	1.92	2.10	23		
Spoleto	—	—	—	—	—	—	—	—	—	—	—	—		
Narni	1.69	2.3	1 24	1.69	4.14	1.29	3.63	0.64	0.64	1.49	1.87	32		
Viterbo	0.00	0.53	1.41	1.32	1.58	1.41	0.70	0.53	0.70	0.00	0.81	25		
Aquila	1.11	1.41	1.93	2 43	2.36	4.14	2.48	1.61	1.48	0.41	1.93	50		
Roma	0.58	0.86	1.35	1.20	0.99	1.02	0.93	0.54	0.75	0.22	0.84	72		
Rocca di Papa	2.94	5.79	3.61	4.39	3.17	3.50	4.54	2.18	2.52	1.26	3.39	65		
Velletri	0.84	1.80	2.28	1.41	1.56	1.56	1.44	1.08	1.08	0.48	1.35	331		
Ceccano	0.00	2.93	0.00	0.00	0.87	1.05	0.00	0.00	0.0	0.00	0.48	28		
Foggia	0.77	1.71	1.07	2.27	2.23	2.10	1.71	3.34	1.71	0.34	1.73	40		
Pozzuoli	1.37	3.19	1.67	0.76	0 60	2.12	0.76	0.76	0.60	0.45	1.22	40		
Lecce	—	—	—	—	—	—	—	—	—	—	—	—		
Corleone	1.45	2.41	2.66	1.69	2.90	1.93	2.42	1.69	2.17	2.17	2.14	30		
Acireale	—	—	—	—	—	—	—	—	—	—	—	—		
Catania	0.96	4.23	6.22	5.07	1.94	7.93	1.58	1.02	1.03	1.03	3.09	57		
Med. microsism.	1.42	2.23	2.32	1.68	1.77	2.26	1.70	1.63	1.33	0.61	1.69.	1566		
Numero di scosse	4	3	3	3	4	3	3	2	3	4	Tot. delle sc. 32			
Intens. massima.	5°	4°	3°	1°	4°	1°	2°	3°	1°	1°				

Decade I.ª Incominciando dunque dalla 1.ª decade del Gennaio 1885 non si può non ricordare che in quel periodo ferveva l'attività endogena nell'Andalusia. Di quel periodo ho avuto già più volte occasione di ragionare specialmente nell'Annuario Meteorologico della Società Met. Ital. (Anno I, pag. 168) e vi ho mostrato la connessione continuata delle burrasche sismiche d'ambedue le regioni, tanto che ho chiamato quel periodo Italo-iberico. I moti microsismici furono piuttosto notevoli sempre ed accompagnarono con costante precedenza i massimi sismici che avvennero nei giorni 1, 5 ed 8. La pressione barometrica sempre alta non parve perturbare l'andamento geodinamico.

January 5, 1885 (seismic maximum)

1885-01-05 06 Queyras (Guillestre - Piemonte) M = 4 - 4.19

1 January 1885 05:26:14 Full Moon 11°02'05 357385.29 km

(Perigee)

OSS. MICROSISM. 1885 Gennajo Decade III.	21	22	23	24	25	26	27	28	29	30	31	Media	N.d'Os.	Media mensile	N. d'Oss.
Spinea di Mestre	1. 54	2. 17	1. 34	2. 37	1. 86	0. 41	1. 44	0. 00	0. 00	0. 00	0. 93	1. 09	44		
Venezia	4. 88	4. 11	4. 54	7. 75	2. 51	3. 36	5. 06	1. 28	0. 60	1. 80	2. 97	3. 50	55		
Verona	0. 48	0. 38	0. 19	2. 62	0. 32	1. 76	0. 09	0. 34	0. 09	0. 06	0. 48	0. 61	43		
Piacenza	1. 50	0. 92	1. 03	1. 04	1. 39	0. 97	0. 77	0. 61	0. 66	1. 23	1. 70	1. 07	33		
Moncalieri	1. 18	2. 34	1. 35	1. 24	2. 24	1. 85	1. 42	1. 85	1. 59	1. 67	1. 25	1. 68	132		
Alessandria	0. 24	0. 38	0. 26	0. 45	1. 27	1. 44	0. 31	0. 48	0. 55	1. 49	2. 55	0. 85	55		
Parma	1. 92	0. 70	1. 03	0. 59	2. 11	1. 40	1. 37	0. 82	1. 02	0. 82	2. 16	1. 26	53		
Bologna - S. Luca	2. 02	2. 19	0. 00	2. 95	1. 89	0. 67	1. 01	0. 78	1. 77	0. 56	0. 50	1. 30	41		
Chiavari	0. 27	0. 14	0. 00	0. 39	1. 31	1. 04	0. 00	0. 14	0. 02	0. 76	2. 76	0. 62	61		
S. Gio: in Galilea	1. 51	2. 64	2. 30	2 32	0. 80	1. 53	1. 75	0. 62	0. 25	0. 21	0. 45	1. 30	65		
Pesaro	2. 89	10.41	7. 46	11.40	1. 40	2. 95	6. 75	0. 98	0. 00	0. 00	0. 42	4. 01	06		
Firenze t. a	0. 67	2. 30	1. 76	2. 21	2. 72	1. 96	1. 76	2. 39	1. 14	1. 96	4. 13	2. 09	74		
Firenze t. n	0. 81	0. 51	1. 22	1. 22	1. 22	1. 11	1. 42	1. 01	0. 41	1. 62	2. 64	1. 19	74		
Livorno	—	—	—	—	—	—	—	—	—	—	—	—	—		
Fermo	3. 56	3. 85	3. 46	4. 41	0. 00	2. 11	0. 75	0. 00	0. 00	0. 00	0. 00	1. 64	22		
Perugia	1. 78	2. 97	2. 37	2. 37	1. 04	2. 08	1. 93	1. 04	0. 59	0. 59	0. 74	1. 59	44		
M. Fortino	5. 44	3. 84	0. 00	4. 29	0. 00	0. 00	0. 00	0. 00	0. 95	0. 00	2. 14	1. 46	27		
Spoleto	—	—	—	—	—	—	—	—	—	—	—	—	—		
Narni	3. 18	1. 88	3. 58	1. 48	2. 93	0. 74	3. 38	1. 88	0. 59	2. 18	1. 29	2. 10	33		
Viterbo	1. 05	1. 05	0. 17	0. 88	0. 17	1. 32	1. 23	0. 53	0. 00	0. 00	1. 23	0. 69	31		
Aquila	2. 49	4. 47	2. 90	3. 32	1. 07	1. 54	1. 43	1. 15	0. 45	0. 11	0. 45	1. 76	55		
Roma	1. 38	0. 64	0. 91	1. 74	1. 18	1. 82	1. 25	1. 08	0. 28	0. 38	1. 29	1. 07	96		
Rocca di Papa	3. 51	1. 78	1. 68	4. 46	3. 36	2. 38	3. 17	3. 10	1. 08	0. 84	2. 88	3. 02	89		
Velletri	1. 83	0. 90	1. 80	2. 72	2. 07	2. 00	1. 56	1. 25	0. 37	0. 14	1. 33	1. 40	364		
Ceccano	0. 00	0. 21	0. 00	—	0. 29	0. 00	0. 00	0. 00	0. 00	0. 00	—	0. 05	34		
Foggia	2. 78	1. 67	3. 46	1. 97	1. 16	1. 88	2. 66	0. 86	1. 12	0. 34	0. 04	1. 63	44		
Pozzuoli	1. 21	0. 91	0. 91	1. 06	0. 60	3. 34	2. 43	0. 60	0. 60	0. 00	0. 00	1. 06	44		
Lecce	—	—	—	—	—	—	—	—	—	—	—	—	—		
Corleone	1. 45	1. 93	2. 90	3. 38	2. 65	1. 45	1. 93	1. 45	1. 93	0. 72	0. 72	1. 86	83		
Acireale	—	—	—	—	—	—	—	—	—	—	—	—	—		
Catania	0. 90	2. 79	1. 07	0. 7	5. 61	3. 37	2. 25	1. 16	1. 06	0. 60	0. 41	2. 27	76		
Med. microsism.	2. 03	2. 13	1. 74	2. 66	1. 59	1. 83	1. 74	0. 94	0. 64	0. 66	1. 35	1. 56	1790		
Numero di scosse	10	4	4	14	19	16	9	6	1	2	6	Totale sc. 100			
Intens. massima.	1°	3°	1°	6°	1°	1°	1°	1°	1°	2°	3°				

done i massimi nel 12, 14, 17, 19 e 20 tutte date quasi decadicamente corrispondenti ai massimi della 1.ª decade.

Decade III. I centri di depressione barometrica si fanno sentire sull'Italia nei giorni 21, 23 e 26 coincidendo coll'agitazione microsismica assai notevole. La quale alla sua volta pure accompagnava e precedeva in massimi sismici ossia i terremoti che non forti ma vieppiù numerosi in questa decade ascesero alla totale cifra del centinaio. I loro maggiori gruppi apparvero ai 21-22, ai 24-28, 31 nuovamente, cioè con distanze approssimativamente decadiche dai precedenti.

M. S. DE ROSSI.

22-23-24 January 1885 (seismic maximum)

1885-01-24 20 Liguria occidentale Mw = 4.40

January 24, 1885	01:26:09	First quarter	04°17'28	375892.94 km
January 30, 1885	16:19:10	Full Moon	11°00'50	362859.31 km
		(Perigee)		

OSS. MICROSISM. 1885 Febbrajo Decade III.	21	22	23	24	25	26	27	28	Media	N.d'Os.	Media mensile	N. d'Oss.
Spinea di Mestre	0. 41	1. 33	0. 71	0. 71	0. 61	0. 00	0. 51	0. 00	0. 53	32		
Venezia	1. 44	4. 59	0. 90	0. 64	0. 64	0. 96	0. 74	0. 74	1. 33	40		
Verona	0. 19	0. 97	0. 43	0. 40	0. 48	0. 48	0. 34	3. 03	0. 79	45		
Piacenza	0. 97	1. 03	1. 08	0. 92	1. 59	0. 92	1. 19	1. 28	1. 12	24		
Moncalieri	1. 53	1. 71	0. 94	1. 79	1. 39	2. 41	1. 48	1. 55	1. 80	96		
Alessandria	0. 93	0. 72	0. 43	0. 36	1. 15	0. 77	0. 45	0. 65	0. 68	40		
Parma	0. 81	0. 86	0. 53	0. 37	0. 29	0. 29	0. 33	0. 41	0. 48	41		
Bologna-S. Luca	0. 33	1. 01	0. 92	0. 50	1. 26	0. 67	0. 00	0. 22	0. 61	29		
Chiavari	0. 59	0. 37	0. 62	0. 04	0. 04	2. 76	0. 00	0. 19	0. 57	46		
S. Gio: in Galilea	0. 77	0. 60	0. 47	0. 53	0. 57	0. 75	0. 28	0. 23	0. 42	51		
Pesaro	0. 56	1. 12	0. 42	0. 28	0. 42	0. 42	0. 14	0. 00	0. 42	48		
Firenze t. a.	1. 43	1. 19	0. 54	0. 35	0. 89	4. 66	0. 07	0. 27	1. 17	64		
Firenze t. n.	1. 13	1. 28	0. 61	0. 65	0. 96	8. 25	0. 30	0. 61	1. 09	64		
Livorno	—	—	—	—	—	—	—	—	—	—		
Fermo	0. 00	0. 00	0. 00	0. 00	0. 00	0. 00	0. 00	0. 38	0. 04	16		
Perugia	0. 59	1. 33	0. 89	1. 64	0. 89	1. 04	0. 59	0. 59	0. 87	32		
M. Fortino	5. 01	0. 95	2. 87	0. 00	2. 52	0. 00	0. 00	2. 14	1. 69	20		
Spoleto	—	—	—	—	—	—	—	—	—	—		
Narni	0. 64	0. 99	3. 18	0. 69	1. 83	1. 14	2. 33	1. 14	1. 32	24		
Viterbo	0. 39	0. 53	0. 17	0. 00	0. 00	0. 66	0. 00	0. 00	0. 21	29		
Aquila	1. 09	1. 43	0. 59	1. 36	1. 57	0. 41	0. 61	0. 48	0. 94	40		
Roma	0. 66	0. 89	0. 37	0. 35	0. 44	1. 16	0. 43	0. 28	0. 54	44		
Rocca di Papa	2. 28	1. 96	1. 51	1. 99	1. 68	1. 32	1. 44	1. 47	1. 70	50		
Velletri	0. 55	0. 76	0. 93	0. 59	0. 36	0. 43	0. 33	0. 37	0. 54	266		
Ceccano	—	0. 00	0. 00	0. 29	0. 00	0. 00	0. 00	0. 29	0. 82	19		
Foggia	0. 86	1. 12	1. 25	1. 50	1. 12	1. 16	0. 34	0. 17	0. 94	32		
Pozzuoli	0. 30	0. 60	0. 76	1. 06	0. 60	0. 60	1. 21	5. 47	1. 32	32		
Lecce	—	—	—	—	—	—	—	—	—	—		
Corleone	1. 45	0. 96	0. 72	1. 45	1. 93	1. 45	1. 93	0. 96	1. 35	23		
Acireale	—	—	—	—	—	—	—	—	—	—		
Catania	0. 69	1. 13	0. 92	0. 78	0. 88	0. 68	0. 99	0. 99	0. 87	41		
Med. microsism.	0. 98	1. 08	0. 84	0. 69	0. 89	1. 05	0. 59	0. 88	0. 88	1288		
Numero di scosse	6	2	1	2	2	4		10	Tot. delle sc.	31		
Intens. massima	3°	2°	2°	2°	1°	6°	3°	3°				

rona. Così i due massimi sismici di questa decade conservaronsi alla medesima distanza periodica dei precedenti corrispondendo quello del 21 all'anteriore del 10, e quello del 26 all'altro del 16.

M. S. DE ROSSI

February 21-26, 1885 (seismic maximum)

1885-02-26	20:48	Pianura Padana	Mw = 5.01

February 21, 1885 Jupiter opposition

March 1, 1885 04:00:14 Full Moon 10°46'29 372102.89 km

OSS. MICROSISM. 1885 Decembre Decade III.	21	22	23	24	25	26	27	28	29	30	31	Media	N.d'Os.	Media mensile	N. d'Os.
Spinea di Mestre	0. 00	0. 20	0. 00	2. 06	1. 14	0. 56	1. 85	0. 30	0. 10	2. 79	2. 29	1. 02	44		
Venezia	0. 26	0. 00	0. 21	1. 06	0. 53	1. 06	0. 53	0. 53	0. 53	2. 40	0. 26	0. 67	66		
Verona	—	—	—	—	—	—	—	—	—	—	—	—	—		
Piacenza	1. 34	1. 28	0. 81	0. 61	1. 12	0. 72	0. 88	1. 62	1. 59	0. 97	0. 81	1. 05	32		
Moncalieri	0. 54	1. 47	1. 41	2. 31	1. 67	1. 77	2. 62	2. 15	2. 01	2. 68	1. 98	1. 87	125		
Alessandria	0. 46	1. 10	0. 70	1. 44	0. 78	0. 62	1. 35	0. 70	0. 76	1 34	1. 23	0. 94	61		
Parma	0. 45	2. 16	0. 66	3 21	3. 06	0. 62	2. 36	0. 58	2. 12	3. 63	2. 92	1. 98	55		
Bologna - S. Luca	0. 00	0 99	0. 16	1. 01	1. 53	0. 84	1. 51	0. 94	0. 00	2. 03	0. 78	0. 89	46		
Chiavari	—	—	—	—	—	—	—	—	—	—	—	—	—		
S. Gio: in Galilea	0. 06	0. 12	0. 12	0. 62	1. 14	0. 42	0. 55	0. 23	0. 08	1. 48	1. 02	0. 53	66		
Pesaro	0. 30	0. 15	0. 00	1. 07	1. 99	0. 76	2. 60	1. 07	0. 00	3. 67	3. 37	1. 36	66		
Firenze t. n	3. 45	3. 34	3. 34	3. 45	3. 34	0. 89	2. 63	0. 20	1. 26	4. 40	3. 50	2. 66	74		
Firenze t. a	1. 03	3. 14	3. 14	1. 03	3. 14	1. 52	0. 81	0. 51	1. 68	2. 90	2. 70	1. 96	74		
Livorno	—	—	—	—	—	—	—	—	—	—	—	—	—		
Fermo	0. 00	0. 00	0. 00	0. 00	6. 65	0. 96	0. 00	0. 00	0. 00	0. 00	4. 95	1. 14	21		
Perugia	0. 59	0. 89	0. 59	0. 59	1. 63	0. 59	1. 48	0. 89	0. 74	2. 67	5. 20	1. 44	44		
M. Fortino	—	0. 00	0. 00	0. 00	1. 43	0. 52	0. 95	0. 47	0. 00	2. 87	1. 91	0. 81	26		
Spoleto	0. 00	0. 00	0. 00	0. 00	2. 42	1. 81	0. 00	2. 42	0. 00	1. 81	2. 42	0. 98	19		
Narni	0 49	0. 34	0. 00	0. 00	0. 99	0. 99	1. 49	1. 49	0. 00	0. 49	1. 74	0. 73	33		
Viterbo	0. 00	1. 05	0. 00	1. 32	1. 05	0. 35	1. 10	0. 53	0 35	0 53	1. 85	0. 74	31		
Aquila	0. 19	0. 46	0. 54	0. 56	4. 04	0. 73	1. 96	1. 57	0. 80	3. 02	3. 00	1. 53	53		
Roma	0. 53	1. 71	0. 88	2. 52	3. 09	0. 93	2. 71	1. 53	1. 26	2. 75	4. 23	2. 01	106		
Rocca di Papa	0. 00	0. 84	0. 84	1. 30	3. 17	0. 84	0. 98	1. 78	0. 92	1. 91	3. 49	1. 46	107		
Velletri	0. 17	1. 22	0. 70	1. 45	2. 38	1. 01	2. 04	1. 15	1. 65	2. 73	3. 83	1. 67	366		
Ceccano	—	—	—	—	—	—	—	—	—	—	—	—	—		
Foggia	0. 21	0. 56	0. 00	0. 00	1. 25	1. 29	1. 71	2. 49	0. 90	1. 58	3. 46	1. 22	44		
Benevento	0. 11	0. 13	0. 22	0. 22	0. 89	0. 56	1. 17	0. 61	0. 55	1. 08	1. 67	0. 65	33		
Pozzuoli	0. 60	0. 60	1. 21	0. 60	6. 08	3. 65	5. 48	6. 69	3. 65	7. 61	7. 30	3. 95	44		
Lecce	0. 40	0. 00	0. 00	0. 00	0. 35	2. 61	3. 22	1. 91	2. 82	2. 51	3. 62	1. 58	33		
Corleone	1. 93	1. 45	1. 69	1. 45	1. 69	1. 21	0. 72	1. 45	1. 93	1. 69	2. 66	1. 62	33		
Acireale	0. 86	0. 15	0. 10	0. 08	1. 32	0. 54	0. 36	1. 02	0. 71	0. 56	1. 08	0. 57	44		
Catania	0. 56	0. 82	0. 32	0. 36	5. 71	1. 52	1. 27	1. 49	1. 28	1. 20	6. 29	1. 89	74		
Med. microsism.	0. 52	0. 86	0. 63	1. 01	2. 26	1. 04	1. 58	1. 29	0. 98	2. 26	2. 84	1. 39	1820		
Numero di scosse	1	1	2	7	3	6	3	2	4	6	10	Totale sc.	45		
Intens. massima.	1	1	1	6	2	9	1	1	7	1	3				

Decade III.ª L'attività microsismica in questa decade tende ad un relativo riposo, manifestando minori i suoi massimi sempre però nella 2ª metà del periodo e col favore barometrico nei soli giorni di maggiore movimento cioè nel 25, 30 e 31. I terremoti furono molti di numero e di forza continuatamente dal 24 al 31 specialmente nel 24, 26, 29, 31. Fu la Basilicata nel 24 e 26 che sopportò gli urti maggiori; la Toscana nel 25; il Veneto nel 29; l'Umbria, il Lazio, e Benevento nel 30 e 31.

24-25 30-31 December (seismic maximum)

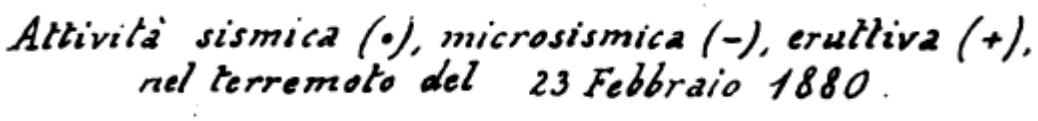
1885-12-24 10:50	Basilicata
1885-12-25 22:45	
1885-12-26 02	Molise
1885-12-26 03	La Gretagna (Basilicata)
1885-12-29	Alpago Cansiglio (Veneto)

December 21, 1885 20:58:34 Full Moon 00°14'03 360297.18 km

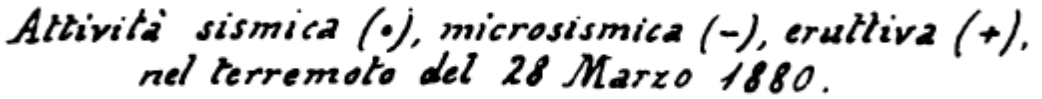
(Perigee)

January 5, 1886 07:43:45 New Moon 14°57'35 404999.84 km

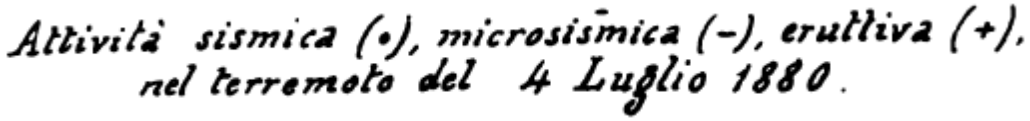
Some seismic events in the years 1880-1881

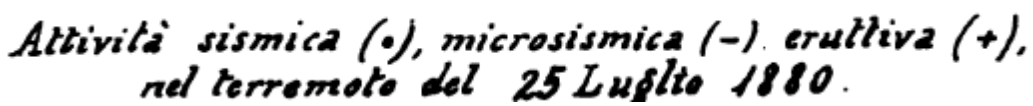


26 February 1880 01:21:57 Full Moon 06°52'03 380821.68 km



March 26, 1880 13:23:38 Full Moon 06°16'43 370160.23 km

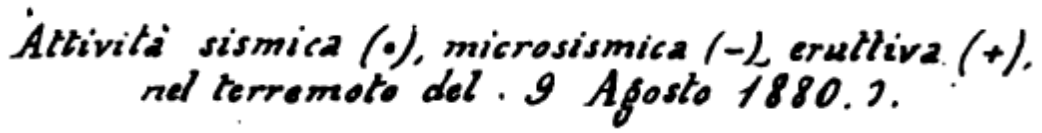




07/07/1880	14.10	Eclisse anulare.	Meridionale	4.42	19.47

July 7, 1880 13:21:29 New Moon 15°43'26 404175.72 km

July 21, 1880 21:02:26 Full Moon 29°23'06 361641.58 km



6 August 1880 03:48:30 New Moon 14°00'11 397385.59 km

Decade III.	21	22	23	24	25	26	27	28	29	30		Media	N.d'Os.
Bologna	1.37	2.12	2.30	0.48	0.69	1.88	1.87	1.36	1.06	0.69		1.33	66
Rimini	0.00	0.42	0.00	o. oo	0.00	1.13	2.12	3.25	1.13	0.00		0.80	20
Firenze t. a	2.33	2.98	1.87	0.34	0.53	0.81	1.46	1.36	0.22	0.30		1.22	110
Firenze t. n	1.41	2.68	1.56	0.59	0.54	1.52	3.30	1.48	0.70	0.54		1.41	110
Livorno	3.85	6.50	6.74	1.92	0.72	4.33	3.85	0.96	1.44	0.48		3.07	19
Fermo	0.34	0.49	0.94	0 31	0.25	0.30	3.03	3.08	1.63	1.15		1.15	31
M. Fortino	0.00	0.61	0.48	0.00	0.48	0.71	0.92	1.43	0.42	0.00		0.50	26
Narni	4 82	4.08	1.26	0.05	0.00	0.25	0.56	0.00	0.74	0.54		1.23	36
Viterbo	0.53	0.66	0.35	1.05	1.05	1.05	1.98	0.52	0.66	0.52		0.83	34
Roma	0.85	1.43	1.46	0.88	0.45	0.80	1.82	2.46	1.55	0.98		1.26	94
Rocca di Papa	0.00	1.68	0.00	0.00	3.37	—	0.00	--	0.00	0.00		0.63	20
Velletri	1.38	2.12	1.76	1.05	0.43	1.19	2.27	1.74	3.01	2.20		1.72	294
Ceccano	0.00	0.00	0.00	0.00	0.00	0.00	1.46	5.27	0.00	0.00		0.67	35
Foggia	1.71	2.14	2.40	0.81	0.21	0.77	0.47	2.06	2.44	2.74		1.57	40
Corleone	1.63	0.90	2.35	1.63	1.44	1.44	1.69	0.72	0.48	1.44		1.37	38
Med. gen. diurna	1.34	1.92	1.56	0.60	0.67	1.15	1.78	1.83	1.03	0.77		1.26	973
1881 MAGGIO Decade I.	1	2	3	4	5	6	7	8	9	10			
Bologna	1.24	0 85	1.30	1.18	2.07	1.59	0.91	0.43	1.77	1.99		1.33	69
Rimini	0.00	0.00	0.00	0.00	o. oo	o. oo	o. oo	1.98	2 97	1.98		0.69	20
Firenze t. a	0.10	1.32	2.84	0.91	0.22	0.10	0.10	0.22	0.12	0.41		0.63	99
Firenze t n	0.54	1.39	2.11	1.19	0.87	0.65	0.45	0.13	0.80	2.00		1.00	99
Livorno	1.44	4.62	4.33	3.37	1.44	0 72	0.48	0.00	0.48	7.23		2.41	19
Fermo	0.18	0.42	0.87	0.73	0.56	1.00	0.57	0.23	0.21	1.92		0.66	25
M. Fortino	o.oo	0.95	1.52	0.47	1.07	0.00	0.95	0.00	0.00	1.67		0.66	25
Narni	0.54	3.46	1.11	0.29	1.35	1.04	0.22	0.45	0.64	1.12		1.02	33
Viterbo	0.00	0.70	1.05	—	1.26	1.45	0.35	0.74	0.00	0.95		0.72	29
Roma	0.16	0.57	1.58	1.08	0.24	0.28	0.58	0.28	0.22	1.82		0.67	88
Rocca di Papa	3.37	3.22	1.26	0.00	0.00	0.00	3.53	0.42	0.00	0.00		1.18	32
Velletri	0.45	1.05	1.20	1.39	0.58	0.47	0.45	0.32	0.33	2.36		0.86	323
Ceccano	0.00	—	1.09	0.87	0.43	—	0.43	0.00	0.00	0.87		0.46	18
Foggia	0.17	1.25	1.12	1.07	0.47	0.17	1.88	0.81	1.37	2.01		1.03	40
Corleone	1.63	1.08	1.81	0.36	1.27	0.18	1.63	1.81	1 63	1.81		1.32	40
Med. gen. diurna	0.65	1.49	1.54	0.92	1.78	0.54	0.83	0.52	0.70	1.87		1.08	959
Decade II.	11	12	13	14	15	16	17	18	19	20			
Bologna	0.92	0 75	0.37	0.95	2.00	0.55	0.87	0.69	0.58	0.31		0.79	63
Rimini	o. oo	0.00	0 00	o. oo	1.69	0.56	0.00	0.00	o. oo	o. oo		0.22	20
Firenze t. a	0.30	0 34	0.22	0.06	0.16	0.06	0.49	0.12	0.00	0.12		0.18	98
Firenze t. n	0.83	0.33	0.54	0 54	0.43	0.24	1.74	0.54	0.00	0.17		0 52	98
Livorno	0.72	1.20	0 96	2.41	0.60	0.24	2.65	0.48	0.24	0.24		0.97	20
Fermo	0.89	0.13	0.25	o. 38	0.26	0.03	0.17	0.76	0.07	0.05		0.30	20
M. Fortino	2.95	0.71	0.00	0.95	0.00	5.30	0.00	0.01	0 35	0.71		1.10	24
Narni	0.79	0.39	2.13	2.28	0.52	1.63	1.59	1.24	0.00	0.09		1.06	28
Viterbo	0.26	0.66	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00		0.12	33
Roma	1.20	0.40	0.45	0.50	0 40	0.14	0.31	0.40	0.16	0.40		0.43	77
Rocca di Papa	0.00	3.79	1.68	o. oo	0.00	2.80	0.42	—	—	—		1.24	25
Velletri	1.50	0.35	1.24	1.21	0.78	0.53	0.48	0.79	0.63	0.54		0.80	329
Ceccano	1.31	0.00	0.00	3.51	0.00	0.00	0.00	3.51	0.00	0.00		0.83	21
Foggia	0.17	0.91	0.81	1.07	0.94	0.17	0.29	1.84	3.21	1.12		0.98	40
Corleone	0.72	0.90	1.63	1.16	0.90	0.90	1.81	2.17	1.27	0.72		1.21	40
Med. gen. diurna	0.83	0.67	0.68	1.00	0.57	0.87	0.74	0.89	0.46	0.32		0.71	936
Decade III.	21	22	23	24	25	26	27	28	29	30	31		
Bologna	0.37	0.31	1.06	0.69	0.37	0.37	0.75	0.37	0.69	0.87	0.75	0.60	67
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22
Firenze t. a	0.12	0.20	0.12	0.36	0.08	0.04	0.12	0.20	0.18	0.16	0.06	0.14	105
Firenze t. n	0.04	0.20	0.43	0.33	0.22	0.29	0.65	0.61	0.47	0.39	0.17	0.33	105
Livorno	0 12	0.48	0.36	1.08	0.48	0.24	1.80	1.03	0.96	0.79	0.96	0.75	21
Fermo	0.01	0.05	0.57	—	0.07	0.11	0.30	0.19	0.46	0.15	0.19	0.21	14
M. Fortino	1.19	1.43	4.58	0.51	2.86	1.48	0.71	0.95	1.43	0.71	0.00	1.44	27

April 23, 1881 6.74 (Microseismic maximum)

1881-04-23	04:12	Paola

28 April 1881 10:24:45 New Moon 08°14'36 386678.20 km

Narni	0.14	0.29	2.98	0.79	0.39	1.04	1.59	0.09	0.00	2.23	0.54	0.91	29
Viterbo	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	32
Roma	0.50	0.25	0.08	0.37	0.30	0.58	0.65	0.47	0.54	0.47	0.37	0.41	84
Rocca di Papa	0.00	2.80	0.84	0.84	3.03	0.00	0.00	0.00	0.81	0.00	0.00	0.76	30
Velletri	0.59	0.29	0.34	0.51	0.45	0.11	0.89	0.61	0.72	0.42	0.42	0.49	355
Ceccano	0.00	0.58	0.58	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.50	0.16	61
Foggia	0.17	0.86	1.29	0.43	0.00	0.34	0.81	0.51	0.17	0.43	0.90	0.55	44
Corleone	0.72	1.63	1.63	1.27	1.81	1.99	1.08	0.72	1.27	1.08	1.99	1.38	44
Med. gen. diurna	0.28	0.62	0.98	0.51	0.67	0.43	0.62	0.39	0.51	0.51	0.45	0.59	1040
1881 GIUGNO Decade I.	1	2	3	4	5	6	7	8	9	10		Media	N.°Os
Bologna	0.37	0.61	0.37	1.18	0.84	2.19	1.92	2.10	1.73	0.75		1.20	62
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.04	0.02	0.06	0.16	0.04	0.32	2.47	2.84	1.52	0.59		0.79	107
Firenze t. n.	0.02	0.20	0.15	0.89	0.31	1.41	2.51	3.29	1.72	0.89		1.09	107
Livorno	0.24	0.36	0.48	0.00	0.84	2.23	7.95	5.06	2.41	0.96		2.05	19
Fermo	0.00	0.00	0.00	0.19	0.07	1.08	0.77	1.02	0.65	0.53		0.43	18
M. Fortino	3.82	2.39	5.31	4.29	3.82	4.29	3.82	10.77	0.00	0.00		3.85	25
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.70	0.88	2.11	0.88	0.53		0.51	28
Roma	0.38	0.41	0.36	0.45	0.20	0.50	1.67	2.06	1.34	0.87		0.82	88
Rocca di Papa	2.24	0.30	0.42	2.73	1.96	0.42	—	3.08	1.54	1.68		1.56	33
Velletri	0.32	0.28	0.35	0.51	0.34	1.82	2.54	2.57	1.02	0.54		1.03	333
Ceccano	0.00	0.00	0.21	0.00	0.58	1.23	2.05	2.41	3.95	0.00		1.04	48
Foggia	0.94	0.12	0.17	0.12	0.12	0.60	2.10	1.97	2.49	0.81		0.94	40
Corleone	0.36	0.72	1.08	1.81	0.36	1.27	1.27	1.44	1.81	0.54		1.06	40
Med. gen. diurna	0.67	0.39	0.68	0.91	0.72	1.39	2.49	3.13	1.62	0.66		1.26	950
Decade II.	11	12	13	14	15	16	17	18	19	20			
Bologna	0.61	1.06	0.81	0.87	0.75	0.55	0.69	0.55	0.54	0.37		0.68	68
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.45	0.83	0.06	0.18	0.06	0.02	0.00	0.06	0.10	0.26		0.20	88
Firenze t. n.	0.78	1.13	0.47	0.72	0.70	0.35	0.26	0.54	0.26	0.33		0.54	88
Livorno	1.44	3.85	1.08	5.06	1.68	0.72	0.96	0.24	0.12	0.36		1.55	18
Fermo	1.04	0.00	0.00	0.05	0.30	0.00	0.00	0.00	0.00	0.00		0.13	12
M. Fortino	—	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71		0.08	21
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	28
Roma	0.69	0.77	0.38	0.63	0.47	0.26	0.32	0.26	0.43	0.49		0.47	84
Rocca di Papa	1.68	1.68	0.00	1.68	0.84	4.21	0.00	0.00	0.00	2.10		1.21	25
Velletri	1.25	1.02	0.78	0.89	0.37	0.61	0.16	0.37	0.45	0.30		0.62	323
Ceccano	1.46	—	0.00	0.00	—	—	0.00	0.00	0.00	0.00		0.21	13
Foggia	0.90	0.12	0.21	1.54	0.12	1.54	0.25	0.04	0.17	0.00		0.36	40
Corleone	0.90	0.90	1.63	1.81	2.53	1.99	1.81	1.81	1.27	1.81		1.64	40
Med. gen. diurna	0.93	0.94	0.41	1.03	0.65	0.85	0.34	0.29	0.25	0.51		0.62	843
Decade III.	21	22	23	24	25	26	27	28	29	30			
Bologna	1.03	1.45	0.37	0.43	0.49	0.63	1.18	0.49	0.91	1.18		0.81	65
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.08	0.16	0.16	0.12	0.24	0.06	0.30	0.08	0.26	0.57		0.20	102
Firenze t. n.	0.54	0.83	0.26	0.02	0.09	0.09	0.67	0.43	1.13	0.87		0.47	102
Livorno	0.72	1.92	0.72	0.12	0.24	0.12	1.44	0.31	1.32	0.96		0.78	19
Fermo	0.00	0.00	0.11	0.13	0.03	0.02	0.24	0.31	0.16	1.29		0.22	28
M. Fortino	0.00	0.00	0.00	0.14	—	0.00	1.43	0.14	0.00	0.14		0.20	16
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	21
Roma	0.33	0.68	0.56	0.54	0.52	0.34	0.82	0.61	0.30	1.64		0.63	63
Rocca di Papa	—	—	—	—	0.00	3.37	4.21	0.00	1.34	2.16		1.84	22
Velletri	0.42	0.30	0.17	0.24	0.32	0.34	0.63	0.60	0.51	1.91		0.54	335
Ceccano	0.00	0.00	—	—	0.35	0.00	0.00	0.00	0.00	0.00		0.04	15
Foggia	0.12	0.08	0.25	1.12	0.00	0.21	0.43	0.34	0.69	2.70		0.59	40
Corleone	0.90	1.08	1.81	1.08	1.81	1.44	1.08	1.81	1.81	0.54		1.38	40
Med. gen. diurna	0.34	0.54	0.40	0.85	0.34	0.50	0.95	0.39	0.64	1.07		0.58	868

9-14-18 June 1881 → 7 June 7.95 14 June 5.06 16 June 4.21 (microseismic maximums)

1881-06-09	Basso Vallese
1881-06-14 01:30	Interlaken
1881-06-18 02:50	Carnia

June 12, 1881 06:56:47 Full Moon 21°23'25 362063.98 km

June 18, 1881 21:18:37 Last quarter 27°41'17 376431.65 km

1881 LUGLIO Decade I.	1	2	3	4	5	6	7	8	9	10		Media	N.d'Os.
Bologna	0.37	0.48	0.37	0 31	0.27	0.4:	0 63	0.92	0.63	1.06		0.54	63
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a.	0.28	0.2?	0.14	0.26	0.12	0.14	0.14	0.26	2.25	1.32		0.53	89
Firenze t. a.	0.35	0.29	0.20	0.13	0.20	0.13	1.15	1.52	0.76	1.26		0.61	89
Livorno	0.48	0.13	0.35	0.35	0.00	0.12	3.85	3.76	4.04	1.68		1.47	20
Fermo	0.40	0.40	0.06	0.48	0.00	0.00	0.00	0.05	0.10	0.00		0.15	25
M. Fortino.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	18
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00		0.02	25
Roma	1.44	0.30	0 25	0.28	0.41	0.41	0.41	1.13	0.41	0.51		0.55	42
Rocca di Papa	2.88	1.96	1.85	0.95	1.05	0.56	1.32	1.89	0 28	1.26		1.39	56
Velletri	1.81	0.66	0.42	0.40	0.38	0.30	0.38	0.41	0.51	0.64		0.59	309
Ceccano	0.00	0.00	0.00	0.00	—	0.00	—	—	0.00	--		0.00	10
Foggia	2.74	1.93	0.21	2.01	1.07	0.00	0.56	1.49	1.93	0.00		1.20	40
Corleone	0.90	0.72	0.72	1.08	0.90	1.68	1.27	1.44	1.08	1 81		1.08	40
Med. gen. diurna	0 89	0.54	0.35	0.48	0.38	0.28	0.80	1.06	0.92	0.73		0.64	826
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**			
Bologna	0 31	0.75	0.25	0.37	0.37	0.31	0. 81	0.63	1.00	0 87		0.56	60
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a	0.14	0.61	0.04	1.01	0.08	0.14	0.18	0.14	0.12	0.16		0.26	95
Firenze t. n.	0.54	0.04	0.35	0.59	0.17	0.15	0.67	0.31	0.33	0.17		0.33	95
Livorno	1.92	0.24	0.14	0.21	0.24	0.48	1.20	0.48	0.31	0.35		0.56	20
Fermo	1.19	0.76	0.03	0.26	0.00	0.02	0.07	0.09	0.03	0.00		0.24	26
M. Fortino	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	21
Narni	—	—	—	—	—	—	—	—	—	—		—	—
Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00		0.02	27
Roma	0.53	0.51	0.27	0.41	0.47	0.20	0.10	0.06	0.20	0.32		0.30	32
Rocca di Papa	0.98	1.85	1.68	1.68	0.84	0.00	1.47	—	0.00	2.24		1.19	35
Velletri	0.64	0.68	0.44	0.29	0.48	0.33	0.60	0.43	0.45	0.50		0.48	308
Ceccano	1.76	—	—	—	—	—	0.58	0.00	—	6.16		2 12	13
Foggia	1.29	1.58	1.25	0.90	0.81	0.56	0.38	1.66	0.73	0.43		0.98	40
Corleone	1.08	0.90	—	—	—	—	—	—	—	1.08		1.03	12
Med. gen. diurna	0.79	0.66	0.40	0.52	0.31	0.19	0. 0	0.36	0.28	0.94		0.62	784
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**		
Bologna	1.18	1.27	0.75	0.43	0.81	0.37	2.07	1.55	0 81	1.06	0.63	0.99	67
Rimini	—	—	—	—	—	—	—	—	—	—	—	—	—
Firenze t. a	0.34	1.74	1.28	0.26	0.34	0.41	1.26	1 34	0 41	0.61	0.55	0.77	103
Firenze t. n.	0.65	1.37	1.02	0.47	0.45	0.78	1.28	1.13	0.51	0.41	0.43	0.76	103
Livorno	0.96	6.74	2.16	0.31	0.31	0.79	6.74	2.41	0.60	0.31	0.21	1.96	21
Fermo	0.00	0.22	0.32	0.51	0.02	0.26	1.58	1.83	1.08	0.65	0.05	0.59	34
M. Fortino	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26
Narni	—	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	0.00	0.52	0.17	0.17	0.00	0.35	2.11	0.70	0.00	0.00	0.00	0.36	30
Roma	0.27	0.54	0.61	0.82	0.54	0.61	2.10	0.89	3.43	0.46	0.51	0.98	40
Rocca di Papa	3.70	1.05	0.84	3.87	0.56	0.84	2.52	—	0.00	0.28	0.00	1.31	31
Velletri	0.47	0.58	1.09	1.01	0.52	0.58	1.61	1.55	3 11	0.70	0.29	1.05	362
Ceccano	0.87	0.00	0.58	0.00	0.00	0.00	0.43	1.88	2.13	0.17	0.00	0.55	53
Foggia	0.17	1.88	1.07	1.75	1.49	0.17	2.66	2 62	2.23	0.86	0.00	1.35	44
Corleone	0.72	0.90	0.36	0.9	1.27	1.08	0.9	0.90	1.81	1.63	0.54	1.00	44
Med. gen. diurna	0.71	1.29	0.79	0.77	0.48	0.48	1.94	1.40	1.24	0.55	0.25	0.99	958
1881 AGOSTO Decade I.	1	2	3	4	5	6	7	8	9	10			
Bologna	0.31	0.43	0.92	1.06	1.00	0.69	0.69	0.45	0.69	1.61		0.78	59
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	20
Firenze t. a.	0.21	0.14	0.10	0.51	0.16	0.59	1.32	0.43	0.20	2.01		0.57	105
Firenze t. n.	0.26	0 39	0.39	0.29	0.47	0.33	0.63	0.70	0.39	2.17		0.59	105
Livorno	0.77	0.09	1.44	0.48	0.21	0.12	0.24	0.07	0.14	1.92		0.55	19
Fermo	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0.00	0.00		0.00	35
M. Fortino	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.96	0.00	0 00		0.10	26
Narni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.49	1.62		0.61	30

18-22 July → 20 July 6.16 (microseismic maximum)

1881-07-18	19:30	Fango
1881-07-22		Belledonne-Pelvoux
1881-07-22	02	Genevois (Chaine des Aravis ?)
1881-07-22	02:45	Belledonne-Pelvoux

18 Jul 1881	05:33:40	Last quarter	25°40'18	382853.95 km
26 Jul 1881	05:19:21	New Moon	03°18'15	406581.25 km

Viterbo	0.00	0.00	0.00	0.00	0.00	0.00	—	—	—	—		0.00	17
Roma	0.30	0.28	0.16	0.28	0.21	0.25	0.41	0.69	0.30	0.50		0.33	41
Rocca di Papa	0.00	0.33	1.51	0.00	0.00	0.84	1.96	2.91	0.84	2.52		1.09	34
Velletri	0.42	0.50	0.62	0.46	0.42	0.35	0.80	0.66	0.51	0.87		0.56	339
Ceccano	0.00	0.00	3.28	0.00	0.00	0.00	0.00	—	—	—		0.46	43
Foggia	0.17	0.00	0.69	2.74	1.66	0.69	1.12	0.69	0.25	0.51		0.85	40
Corleone	0.90	1.27	0.72	0.54	0.90	0.36	1.27	1.45	1.45	1.27		1.01	40
Med. gen. diurna	0.23	0.23	0.70	0.42	0.33	0.28	0.60	0.79	0.48	1.38		0.54	958
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**		**Media**	**N.d'Os.**
Bologna	2.45	0.92	0.55	1.61	3.36	0.55	1.18	1.53	1.00	0.75		1.39	65
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	20
Firenze t. a	1.05	0.57	0.21	2.23	1.64	0.83	2.70	2.23	0.65	0.24		1.23	101
Firenze t. n	1.19	0.65	0.76	2.15	2.00	0.91	1.09	2.06	0.80	0.43		1.19	101
Livorno	4.57	1.68	4.09	2.89	1.20	1.44	2.89	5.30	2.89	0.12		2.70	19
Fermo	0.00	0.00	0.00	0.00	0.00	0.06	—	0.57	0.82	0.52		0.22	27
M. Fortino	0.00	0.00	0.71	0.00	1.91	0.00	0.47	3.34	0.00	0.00		0.64	28
Narni	2.72	0.14	0.00	1.49	0.39	0.07	1.63	5.97	0.00	0.81		1.32	21
Viterbo	—	—	—	1.05	1.93	0.00	0.00	—	0.00	—		0.59	10
Roma	0.71	0.00	0.10	0.00	1.03	0.40	0.00	1.16	0.61	0.07		0.40	28
Rocca di Papa	2.24	0.56	1.68	2.52	2.52	2.38	1.68	3.37	0.00	0.00		1.69	32
Velletri	1.02	0.40	0.42	1.20	2.55	1.11	1.68	1.65	0.81	0.41		1.13	339
Ceccano	—	—	—	—	—	—	—	—	0.00	0.12		0.06	10
Foggia	0.98	0.64	0.50	0.43	5.82	3.03	1.88	3.59	0.69	0.69		1.83	40
Corleone	0.90	0.72	1.81	1.27	1.08	0.36	0.72	1.45	1.45	1.63		1.13	40
Med. gen. diurna	1.37	0.48	0.84	1.20	1.81	0.79	1.22	2.47	0.64	0.41		1.12	881
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**		
Bologna	0.68	0.55	0.94	0.51	1.49	1.49	0.87	1.65	1.57	0.82	0.49	1.00	70
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.26	0.00	0.00	0.29	22
Firenze t. a	0.12	0.30	0.14	0.20	0.71	0.13	0.63	1.42	0.69	0.26	0.04	0.42	95
Firenze t. n	0.65	1.09	1.09	1.17	0.87	0.61	0.22	1.56	1.19	0.87	0.85	0.92	95
Livorno	0.48	0.60	1.44	3.61	0.72	0.53	0.14	6.02	2.89	0.48	0.48	1.58	21
Fermo	0.00	0.05	0.43	0.34	0.28	0.20	0.23	0.09	0.00	1.15	0.51	0.29	28
M. Fortino	0.00	2.58	0.00	2.39	1.91	0.00	0.00	5.30	0.00	0.00	0.00	1.10	30
Narni	0.00	3.80	0.00	0.07	0.81	0.00	0.07	0.81	1.49	0.05	0.00	0.64	23
Viterbo	—	—	—	—	—	—	—	1.05	0.17	0.52	0.00	0.43	12
Roma	0.20	0.54	0.68	0.54	0.40	0.56	0.24	0.51	0.71	0.82	0.05	0.47	34
Rocca di Papa	1.68	3.37	0.84	0.56	0.56	0.00	0.00	0.00	0.00	2.10	0.00	0.82	28
Velletri	0.33	0.64	0.74	0.55	0.54	0.91	0.44	3.70	1.24	1.47	0.36	0.99	339
Ceccano	0.17	0.14	0.70	0.10	0.12	0.00	0.00	0.35	0.44	0.00	0.00	0.18	56
Foggia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.97	1.75	2.49	0.00	0.56	44
Corleone	0.72	0.90	0.90	1.45	0.90	0.36	1.27	0.90	1.81	1.63	1.81	1.15	44
Med. gen. diurna	0.35	1.04	0.56	0.82	0.66	0.34	0.29	1.68	1.14	0.84	0.30	0.72	911
1881 SETTEMBRE Decade I.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			
Bologna	2.76	1.55	1.27	0.37	1.62	0.81	3.06	0.63	1.30	1.06		1.44	60
Rimini	0.00	0.00	4.95	1.41	0.00	0.00	0.00	0.00	0.00	1.55		0.79	20
Firenze t. a	0.00	0.18	0.14	0.14	0.22	0.57	0.45	0.53	1.07	2.98		0.63	83
Firenze t. n	1.09	1.02	0.78	0.59	0.70	0.59	2.21	0.22	0.54	0.80		0.85	83
Livorno	7.90	4.82	3.61	2.89	0.24	3.37	—	0.96	3.13	1.80		3.19	16
Fermo	0.13	1.65	0.92	0.38	0.78	0.57	0.98	0.53	0.16	1.19		0.72	23
M. Fortino	0.75	2.87	1.09	0.00	0.00	0.00	7.91	0.47	0.00	0.00		1.30	24
Narni	0.09	6.16	0.00	0.56	0.37	0.00	3.73	0.49	0.54	0.00		1.19	28
Viterbo	1.48	1.05	0.00	0.00	—	—	1.58	0.00	0.00	0.00		0.51	22
Roma	1.31	2.77	0.46	0.00	0.00	0.00	1.43	0.82	0.40	1.25		0.84	42
Rocca di Papa	4.98	1.68	1.68	1.12	0.00	3.37	0.84	0.84	0.56	0.42		1.54	34
Velletri	2.80	2.49	1.56	0.56	0.41	0.38	1.21	0.67	0.42	2.91		1.34	306
Ceccano	2.13	1.50	0.99	0.00	0.00	0.00	0.43	0.00	0.00	0.00		0.50	56
Foggia	1.93	4.28	1.75	0.69	0.51	1.84	2.06	0.51	0.00	1.03		1.46	40
Corleone	2.35	1.63	1.08	0.36	0.18	0.72	0.36	0.18	1.08	0.72		0.86	40
Med. gen. diurna	1.98	2.21	1.35	0.60	0.35	0.87	1.87	0.45	0.61	1.05		1.14	877

August 3, 1881 3.28 ; August 15, 5.82 ; August 28, 6.62

1881-08-03	14:42	Alessandrino
1881-08-05		Belledonne-Pelvoux

3 August 1881	04:42:49	First quarter	10°56'05 383	704.82 km
9 August 1881	21:07:07	Full Moon	17°20'25 357	400.90 km

Decade II.	11	12	13	14	15	16	17	18	19	20	Media	N.d'Os.
Bologna	1.12	1.13	1.12	0.49	0.25	0.84	1.06	0.92	1.49	0.43	0.88	60
Rimini	0.00	1.01	0.00	0.00	1.69	0.00	0.00	0.00	2.54	0.84	0.60	20
Firenze t. a.	0.16	0.71	0.47	0.36	0.04	0.49	0.30	0.36	0.30	0.20	0.32	99
Firenze t. n.	0.54	1.98	0.89	0.83	0.39	0.87	0.59	0.65	0.67	0.74	0.80	99
Livorno	0.84	3.13	2.89	0.96	0.14	1.68	0.48	0.48	0.07	0.24	1.09	20
Fermo	0.19	0.00	0.00	0.78	0.76	0.26	0.91	—	—	0.00	0.36	18
M. Fortino	0.71	0.00	1.43	0.00	0.00	0.47	0.71	0.00	0.00	0.00	0.33	23
Narni	1.49	0.00	0.00	0.00	0.09	0.14	0.61	0.00	0.00	0.05	0.24	26
Viterbo	1.32	0.26	0.00	0.00	0.00	0.00	0.53	0.00	0.00	0.17	0.22	27
Roma	1.64	0.61	0.30	0.00	0.35	0.20	0.86	0.82	0.00	0.00	0.17	26
Rocca di Papa	2.52	1.12	1.12	0.00	0.84	0.00	0.00	1.68	0.00	—	0.80	20
Velletri	1.59	0.93	0.56	0.60	0.62	0.55	1.39	2.00	0.40	0.60	0.92	220
Ceccano	0.73	0.00	0.00	0.00	0.00	0.78	0.21	0.65	0.00	0.00	0.23	50
Foggia	0.90	1.93	0.98	0.29	1.49	2.14	3.34	1.20	0.34	0.64	1.33	40
Corleone	0.99	1.27	1.81	0.72	0.72	0.54	0.90	0.18	0.90	1.63	1.06	40
Med. gen. diurna	1.04	0.93	0.77	0.33	0.49	0.59	0.79	0.59	0.44	0.36	0.64	788
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**		
Bologna	1.24	1.24	3.16	2.99	3.16	1.12	1.76	1.97	2.85	4.48	2.39	62
Rimini	0.00	0.00	0.00	0.00	3.96	3.25	3.67	2.12	1.98	2.54	1.75	20
Firenze t. a.	0.24	2.98	2.80	0.36	0.75	0.47	0.32	2.07	0.28	2.15	1.24	114
Firenze t. n.	0.78	2.54	1.52	1.09	1.15	0.93	0.74	3.55	1.09	2.04	1.54	114
Livorno	0.72	7.71	5.51	1.44	1.34	0.24	0.48	6.26	0.24	2.41	2.10	20
Fermo	0.00	0.15	0.61	0.59	0.76	0.59	1.28	0.05	0.98	0.84	0.55	21
M. Fortino	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.35	—	—	0.16	17
Narni	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	0.35	1.23	1.23	0.70	1.05	1.23	0.88	0.00	1.58	1.76	1.00	28
Roma	0.00	—	1.37	—	1.64	1.64	2.47	0.49	0.00	0.97	1.06	17
Rocca di Papa	0.84	—	2.21	0.00	—	0.42	3.37	0.00	2.02	2.52	1.42	24
Velletri	0.43	1.16	1.26	1.62	1.08	2.54	1.67	0.52	0.71	1.21	1.22	221
Ceccano	0.00	0.00	0.14	0.22	0.00	0.87	0.87	0.17	0.17	0.52	0.29	45
Foggia	0.00	1.97	2.53	2.62	4.06	4.15	0.69	3.71	1.84	3.03	2.46	40
Corleone	0.18	0.90	0.00	1.81	1.45	1.08	0.90	0.72	1.81	0.72	0.95	40
Med. gen. diurna	0.36	1.38	1.49	0.89	1.36	1.23	1.27	1.05	1.03	1.67	1.20	783
1881 OTTOBRE **Decade I.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
Bologna	5.00	4.43	2.29	2.30	1.87	3.29	1.98	2.67	1.24	1.49	2.65	65
Rimini	4.95	2.54	1.83	0.99	0.99	0.28	0.00	0.00	0.00	0.00	1.15	20
Firenze t. a.	1.00	0.81	0.38	0.61	0.61	0.61	1.26	1.70	1.36	1.11	1.00	110
Firenze t. n.	1.93	1.76	0.56	0.83	1.41	1.89	1.96	2.65	0.61	0.80	1.43	110
Livorno	0.48	0.96	0.48	1.44	0.72	4.82	3.42	7.23	2.16	0.38	2.20	20
Fermo	1.15	1.02	1.19	1.90	2.90	1.21	2.69	1.13	1.59	1.38	1.61	20
M. Fortino	—	—	—	—	—	—	—	—	—	—	—	—
Narni	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	2.82	0.39	0.00	0.00	1.19	1.05	1.58	0.79	1.32	0.17	0.93	31
Roma	—	0.41	0.20	0.41	0.88	0.61	0.51	1.02	1.64	0.76	0.71	21
Rocca di Papa	0.00	3.36	0.84	0.00	1.68	1.96	2.24	0.42	1.40	0.00	1.19	28
Velletri	1.38	0.70	0.45	0.43	1.47	0.94	2.22	0.83	1.07	0.76	1.02	315
Ceccano	0.00	0.00	0.00	0.00	0.70	0.00	0.65	0.00	0.00	0.00	0.13	40
Foggia	2.40	1.37	1.41	1.88	1.25	1.88	1.58	0.86	0.86	1.08	1.45	40
Corleone	0.54	1.27	0.90	0.54	0.54	1.45	0.36	0.72	0.36	0.54	0.72	40
Med. gen. diurna	1.85	1.46	0.81	0.87	1.24	1.53	1.57	1.54	1.04	0.64	1.25	860
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**		
Bologna	1.67	1.18	0.63	0.63	1.06	2.79	0.92	0.92	0.87	1.61	1.22	57
Rimini	0.00	0.00	0.00	0.00	0.99	1.69	1.83	0.00	0.00	0.00	0.45	20
Firenze t. a.	1.38	0.69	0.61	1.07	0.24	2.78	0.73	0.61	0.71	2.86	1.15	108
Firenze t. n.	1.52	0.98	0.78	1.28	1.52	1.76	1.02	0.91	1.90	4.35	1.61	108
Livorno	2.89	0.09	0.72	1.20	5.78	3.13	1.20	0.33	0.72	4.57	2.06	19
Fermo	2.25	1.17	1.79	1.00	0.21	1.79	1.71	0.07	0.00	0.31	1.03	20
M. Fortino	—	—	—	0.00	—	—	—	0.00	0.00	0.00	0.00	8
Narni	—	—	—	—	—	—	—	—	—	—	—	—

1 September 7.90 – 2 Sept. 6.16 – 7 Sept. 7.91 – 22 Sept. 7.71 – 23 Sept. 5.51 - 28 Sept. 6.26

1881-09-10	07	Chietino
1881-09-21	21:20	Tarentaise (Moutiers)
1881-09-28		Cesena

September 15, 1881	08:01:40	Last quarter	22°35'30	397730.55 km
September 23, 1881	11:54:48	New Moon	00°34'30	397300.47 km
September 30, 1881	21:48:28	First quarter	07°51'26	372356.18 km

Viterbo	0.00	0.00	0.00	0.79	1.41	0.00	0.26	0.17	0.35	1.32		0.43	25
Roma	0.92	1.06	0.51	0.41	1.02	1.44	1.13	—	0.51	2.06		1.01	26
Rocca di Papa	1.26	0.00	0.42	—	2.36	1.68	0.42	0.84	0.00	1.68		0.96	27
Velletri	0.89	1.30	0.64	0.85	1.05	2.96	1.58	0.79	0.29	1.69		1.20	317
Ceccano	0.00	0.00	0.58	0.00	0.00	0.00	0.43	0.52	0.43	0.00		0.19	33
Foggia	5.43	0.86	0.00	0.69	1.93	4.96	1.41	2.06	0.98	0.69		1.90	40
Corleone	1.63	0.54	1.27	1.27	0.72	1.27	0.90	0.36	1.08	1.08		1.01	40
Med. gen. diurna	1.52	0.60	0.61	0.70	1.40	2.01	1.04	0.58	0.56	1.58		1.06	848
Decade III.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**Media**	**N.d'Os.**
Bologna	2.24	1.37	2.79	1.87	1.12	1.24	0.75	0.45	0.15	0.82	0.75	1.23	58
Rimini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22
Firenze t. a	6.04	2.23	1.03	1.11	2.03	0.51	0.47	0.43	0.71	1.76	1.32	1.60	112
Firenze t. n	2.79	2.00	0.22	1.48	1.35	0.74	1.68	0.87	1.02	0.89	1.76	1.33	112
Livorno	10.12	2.89	10.11	2.65	—	2.16	1.44	0.72	0.72	0.96	2.89	3.46	20
Fermo	0.92	1.34	1.25	0.90	0.90	0.84	0.86	0.98	0.55	1.42	1.15	1.01	23
M. Fortino	1.92	0.00	0.00	0.47	0.71	0.00	0.00	0.00	0.00	1.43	—	0.45	26
Narni	—	—	—	—	—	—	—	—	—	—	—	—	—
Viterbo	2.64	0.13	1.05	1.94	0.00	0.35	1.05	0.00	0.26	2.11	3.44	1.17	34
Roma	1.91	1.09	0.00	0.75	0.56	0.92	0.82	0.64	0.82	1.91	2.59	1.09	60
Rocca di Papa	—	—	—	2.52	—	0.00	2.24	0.00	0.00	0.00	0.00	0.68	15
Velletri	3.30	1.12	0.86	1.15	1.48	0.94	0.81	0.32	2.44	2.05	2.39	1.53	364
Ceccano	0.43	0.00	0.35	0.00	0.17	0.00	0.00	0.00	0.00	0.00	1.31	0.20	39
Foggia	3.42	0.86	0.51	1.88	3.76	1.84	0.00	0.34	1.71	2.66	2.40	1.76	44
Corleone	1.81	0.90	0.54	0.54	1.45	1.81	0.90	1.81	2.35	1.45	0.90	1.31	44
Med. gen. diurna	2.88	1.07	1.44	1.23	1.12	0.81	0.78	0.46	0.76	1.24	1.60	1.21	973
1881 NOVEMBRE **Decade I.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			
Bologna	1.30	1.86	0.68	0.52	0.37	0.00	0.25	0.43	0.69	1.61		0.76	58
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a	3.59	0.26	0.73	0.59	0.57	0.38	0.61	0.34	1.76	1.22		0.99	96
Firenze t n	2.24	1.52	1.03	0.70	0.83	0.93	0.85	0.89	1.41	1.74		1.26	96
Livorno	0.96	1.68	1.44	0.72	0.48	0.48	0.00	0.48	3.13	1.20		1.05	18
Fermo	1.19	—	—	—	0.46	0.11	0.65	0.77	3.97	4.53		1.66	12
M. Fortino	1.43	1.91	0.00	0.71	0.00	0.00	0.00	0.45	1.44	0.95		0.68	25
Narni	0.75	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.44		0.14	25
Viterbo	2.17	1.05	0.35	0.00	0.00	0.17	0.00	0.32	1.94	1.85		0.78	36
Roma	5.79	1.40	0.69	0.33	0.20	0.22	0.20	0.26	3.88	1.75		1.47	105
Rocca di Papa	0.00	1.68	2.52	0.84	0.00	0.00	0.00	1.68	1.68	—		0.93	19
Velletri	9.17	2.08	0.44	0.36	0.32	0.16	0.35	0.75	4.78	2.79		2.12	322
Ceccano	2.63	0.43	0.00	0.21	0.00	0.00	0.35	0.00	2.28	1.31		0.73	35
Foggia	4.58	4.40	0.17	0.77	0.18	0.51	0.90	0.86	1.66	4.32		1.91	40
Corleone	1.81	0.54	1.27	0.36	0.90	1.08	1.27	1.08	0.18	1.08		0.95	40
Med. gen. diurna	2.68	1.44	0.73	0.47	0.36	0.28	0.38	0.59	2.05	1.90		1.10	927
Decade II.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**			
Bologna	1.92	0.30	—	—	—	—	0.75	1.04	1.19	1.06		1.04	33
Rimini	—	—	—	—	—	—	—	—	—	—		—	—
Firenze t. a	0.85	0.36	0.43	0.73	0.65	10.22	0.81	1.46	1.01	0.67		2.27	107
Firenze t. n	1.28	0.72	0.96	0.47	0.70	2.37	1.15	1.85	0.70	1.09		1.11	107
Livorno	0.96	0.48	0.96	0.48	0.48	0.55	3.32	2.21	1.44	1.68		1.25	17
Fermo	4.14	1.13	0.26	0.22	0.86	0.70	0.03	3.12	2.11	0.38		1.29	24
M. Fortino	0.47	0.00	0.00	0.00	0.00	0.00	0.00	1.91	0.95	1.43		0.47	25
Narni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.64	0.00		0.16	26
Viterbo	0.79	0.00	0.00	0.00	0.17	0.00	0.00	3.00	1.94	0.70		0.66	26
Roma	1.08	0.53	0.24	0.43	0.32	0.28	0.12	1.25	2.94	0.64		0.78	99
Rocca di Papa	1.68	2.02	0.00	2.10	0.84	0.00	2.80	0.00	0.00	2.52		1.19	29
Velletri	1.76	0.64	0.40	1.10	0.43	4.55	0.28	2.29	5.68	1.08		1.82	333
Ceccano	0.87	0.00	0.00	0.00	0.00	0.00	0.00	3.22	4.92	0.43		0.94	32
Foggia	4.06	2.49	0.81	2.27	2.55	3.08	0.38	1.66	2.95	2.49		2.27	40
Corleone	0.54	1.63	1.27	1.81	2.35	1.63	1.45	2.17	1.81	2.35		1.70	40
Med. gen. diurna	1.45	0.72	0.41	0.74	0.72	2.23	0.79	1.80	2.09	1.18		1.21	938

1 October 4.95 – 11 October 5.43 – 15 October 5.78 – 16 October 4.96 – 21-23 October 10.12

7 October 1881 13:59:21 Full Moon 14°26'15 369396.50 km

1 November 5.79 – 9 November 4.78 – 16 November 13.92 – 19 November 5.68

1881-11-05 08:42	Carinthia, Gmuend
1881-11-14 02:55	Montreux
1881-11-25 17:25	Vaud, Aigle

November 6, 1881 02:03:17 Full Moon 13°49'52 380012.05 km

November 13, 1881 23:01:27 Last quarter 21°45'01 404240.24 km

November 21, 1881 16:21:36 New Moon 29°32'50 375651.69 km

November 28, 1881 12:01:39 First quarter 06°27'09 370979.09 km

Decade III.	21	22	23	24	25	26	27	28	29	30	Media	N.d'Os.
Bologna	0.37	0.82	0 52	1.80	0.75	1.42	1.63	1.49	2 66	1.43	1. 28	57
Rimini	—	—	—	—	—	—	—	—	—	—	—	—
Firenze t. a.	0. 63	1.07	1.56	0.59	1.68	0.30	0.81	1 28	1.34	1. 17	1.03	102
Firenze t. n.	1.02	0. 89	0. 87	0. 70	1.67	0. 33	0. 72	1.41	2. 37	2. 30	1. 22	102
Livorno	0. 96	1. 44	0. 48	0. 60	1. 26	0. 48	—	—	—	—	0. 86	11
Fermo	0. 42	0. 16	0. 12	0. 00	0. 25	0. 09	0. 19	0. 36	0. 28	0. 38	0. 22	20
M. Fortino	0. 00	1. 13	0. 00	0. 04	1. 91	o. oo	o. oo	1. 43	0. 00	o. oo	0. 48	24
Narni	0. 00	0. 15	2. 39	0. 37	0. 15	o. oo	o. oo	o. oo	0. 00	o. oo	0. 30	31
Viterbo	0. 60	0. 00	0. 00	0. 00	o. oo	o. oo	o. oo	1. 76	1. 72	1. 90	0. 53	30
Roma	0. 12	0. 23	0. 70	0. 34	0. 31	0. 14	0. 12	0. 75	0. 58	o. 64	0. 39	86
Rocca di Papa	0. 00	2. 24	1. 68	2. 94	o. oo	1 68	o. oo	0. 00	o. oo	o. oo	0. 85	25
Velletri	0. 38	0. 40	0. 58	0. 26	0. 59	0. 53	0. 45	0. 62	0. 77	0. 69	0. 53	340
Ceccano	0. 00	0. 21	0. 58	o. oo	1. 31	o. oo	o. oo	0. 00	0. 58	o. oo	0. 26	29
Foggia	0. 73	0. 86	1. 03	0. 60	0. 56	0. 51	o. oo	1 03	0. 17	o. 12	0. 56	40
Corleone	0. 08	0. 90	0. 18	1. 27	1. 08	0. 72	o. 36	1. 08	1. 63	1. 63	0. 99	40
Med. gen. diurna	0. 40	0. 77	0. 76	0. 68	0. 82	0. 45	o. 33	0. 86	0. 93	0. 79	0. 67	937

MEDIE MENSILI

STAZIONI	1880 Dccembre	1880 Gennaio	Febbraio	Marzo	Aprile	Maggio	Giugno	Luglio	Agosto	Settembre	Ottobre	Novembre	Media annua locale	Numero d'Osservazioni
Bologna	0. 83	1. 97	1. 84	0. 86	1. 01	0. 90	o. 89	0. 69	1. 05	1. 57	1. 70	1. o2	1. 19	2187
Rimini	0. 17	1. 44	0. 51	0. 32	0. 29	0. 30	—	—	0. 09	1. 04	0. 53	—	0. 52	548
Firenze t. a.	1. 16	2. 72	1. 41	0. 95	0. 93	0. 30	0. 38	0. 52	0. 74	0. 73	1. 24	1. 42	1. 04	3790
Firenze t. n.	1. 09	3. 12	1. 76	1. 32	1. 19	0. 61	0. 70	0. 56	0. 89	1. 06	1. 46	1. 19	1. 21	3789
Livorno	2. 15	5. 83	1. 40	2. 62	2. 02	1. 38	1. 46	1. 33	1. 61	1. 99	2. 57	1. 05	2. 11	680
Fermo	0. 82	4. 00	1. 48	1. 41	0. 58	0. 39	0. 26	0 32	0. 17	0. 53	1. 21	1. 05	1. 01	881
M. Fortino	1. 52	1. 73	1. 85	1. 14	0. 75	1. 06	1. 37	o. 00	0. 61	0. 59	0. 22	o. 54	0. 94	825
Narni	0. 26	1. 05	—	1. 29	0. 97	0. 99	—	—	0. 85	0. 71	—	o. 2o	0. 79	614
Viterbo	0. 88	2. 68	0. 80	0. 93	0. 50	0. 29	0. 17	0. 13	1. 34	0. 57	o. 84	o. 65	0. 73	994
Roma	1. 11	2. 72	1. 37	1. 44	0. 89	0. 50	0. 61	0. 61	0. 40	0. 79	0. 94	o. 88	1. 02	2539
Bocca di Papa	1. 03	2. 03	1. 17	1. 53	1. 16	1. 06	1. 53	1. 29	1. 20	1. 25	. 94	0. 99	1. 26	1058
Velletri	0. 89	2. 07	1. 11	1. 44	1. 10	0. 72	0. 73	0. 71	0. 90	1. 16	1. 25	1. 19	1. 12	1169
Ceccano	0. 23	1. 14	0. 72	0. 46	0. 29	0. 48	0. 43	0. 89	0. 23	0. 34	0. 17	0. 61	0. 50	1263
Foggia	1. 41	2. 00	1. 68	2. 60	1. 18	0. 85	0. 62	1. 17	1. 08	—	1. 70	1. 58	1. 44	1340
Corleone	1. 41	1. 48	1. 36	1. 40	1. 41	1. 30	1. 34	1. 03	1. 09	0. 95	1. 01	1. 21	1. 25	1428
Media generale	0. 99	2. 43	1. 31	1. 32	0. 95	0. 79	0. 82	0. 75	0. 79	0. 97	1. 17	0. 99	1. 07	
Tot. delle Osserv.	2751	3083	2579	3017	2871	2935	2661	2568	2745	2328	2081	2802		39021

Cholet
Tours
Digione
Basilea
Sciaffusa
BAVIERA
Zurigo
Salisburgo
Győr
Budapest
Debrecen
Bistrița
Poitiers
Bourges
Besançon
Berna
Itinerari tematici
AUSTRIA
Graz
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Oradea
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Niort
Montluçon
Moulins
Losanna
Laghi e ghiacciai
Klagenfurt
Maribor
UNGHERIA
ROMANIA
LIMOSINO
Roanne
Sion
Bellinzona
Seghedino
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Lione
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Pisco Rotondo
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Lushnjë
Salonicco
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ALBANIA
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Sassari
Valona
Kozáni
Palma di Maiorca
Sarande
Lárissa
Mar Tirreno
Corfù
Ioánnina
Vólos
Cosenza
Lamia
Cagliari
Sant'Eufemia Lamezia
Agrínion
GRECIA
Catanzaro
Patrasso
Aíyion
Mar Mediterraneo
Mar Ionio
Atene
Palermo
Messina
Athinai
Etna 3323 m
Pírgos
Tripoli
ISOLE EGEE
Biserta
Catania
Algeri
Dellys
Banzart
Bacino dello Ionio -5150 m
Kalámata
Bejaia
Tunisi
Ech Cheliff
Bouira
Costantina
Qacentina
Stif
Al Kāf
Khaniá
Souk Ahras
Nābul
Bordj Bou Arreridj
Sougueur
Batna
Monastir
CRETA
ALGERIA
TUNISIA
Lampedusa
La Valletta
Tébessa
MONTI DELL'ATLANTE
Biskra
Sfax

April 23, 1881 6.74 (Microseismic maximum)

June 9-14-18, 1881 → June 7 7.95 June 14 5.06 June 16 4.21 (microseismic maximums)

July 18-22 → July 20 6.16

August 3, 1881 3.28 ; August 15 5.82 ; 28 August 6.62

1 September 7.90 – 2 Sept. 6.16 – 7 Sept. 7.91 – 22 Sept. 7.71 – 23 Sept. 5.51 - 28 Sept. 6.26 - 1 Oct. 4.95 – 11 Oct. 5.43 – 15 Oct. 5.78 – 16 Oct .96 – 21-23 Oct. 10.12
1 November 5.79 – 9 Nov. 4.78 – 16 Nov. 13.92 – 19 Nov. 5.68

Average seismic maximums:

(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)/7

Input

$$\frac{1}{7}(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)$$

Result

8.488571428571428571428

Alternative representation

$$1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{7(2e)}} = 1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{7(2\exp(z))}} \quad \text{for } z = 1$$

Series representations

$$1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{7(2e)}} = 1+0.235611\sum_{k=0}^{\infty}\frac{1}{k!}$$

$$1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{7(2e)}} = 1+0.117805\sum_{k=0}^{\infty}\frac{1+k}{k!}$$

$$1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{7(2e)}} = 1+\frac{0.235611\sum_{k=0}^{\infty}\frac{-1+k+z}{k!}}{z}$$

$n!$ is the factorial function

From the sum of the previous values, we obtain, after some calculations:

96/(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)

Input

$$\frac{96}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}$$

Result

1.615617637159205654661730057219791316055200269269606193200942443 6
…

1.61561763715…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

And:

98/(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)

Input

$$\frac{98}{6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92}$$

Result

1.649276337933355772467182766745203635139683608212722988892628744 5
…

1.6492763379….

From the mean with the previous expression, we obtain:

1/2(((1+1/(((1/(2e))((6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)/7)))))+((98/(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92))))

Input

$$\frac{1}{2}\left(\left(1+\frac{1}{\frac{1}{2e}\left(\frac{1}{7}(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)\right)}\right)+\frac{98}{6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92}\right)$$

Result

1.64486659036037220881053538033437626193707050918713761401495747 88…

1.64486659036…. ≈ $\zeta(2) = \pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternative representation

$$\frac{1}{2}\left(\left(1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{(2\,e)\,7}}\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)=$$
$$\frac{1}{2}\left(\left(1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{(2\exp(z))\,7}}\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)\text{ for } z=1$$

Series representations

$$\frac{1}{2}\left(\left(1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{(2\,e)\,7}}\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)=$$
$$1.32464+0.117805\sum_{k=0}^{\infty}\frac{1}{k!}$$

$$\frac{1}{2}\left(\left(1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{(2e)7}}\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)=1.32464+0.0589027\sum_{k=0}^{\infty}\frac{1+k}{k!}$$

$$\frac{1}{2}\left(\left(1+\frac{1}{\frac{6.74+7.95+6.16+6.62+7.91+10.12+13.92}{(2e)7}}\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)=1.32464+\frac{0.117805\sum_{k=0}^{\infty}\frac{-1+k+z}{k!}}{z}$$

$n!$ is the factorial function

And again:

((1/2(((1+1/(((1/(2e))((6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)/7)))))+((98/(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92))))))^15-16-Φ

Input

$$\left(\frac{1}{2}\left(\left(1+\frac{1}{\frac{1}{2e}\left(\frac{1}{7}(6.74+7.95+6.16+6.62+7.91+10.12+13.92)\right)}\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)\right)^{15}-16-\Phi$$

Φ is the golden ratio conjugate

Result

1729.04…

1729.04….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2.

Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

(1/27((((1/2(((1+1/(((1/(2e))((6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92)/7)))))+((98/(6.74 + 7.95 + 6.16 + 6.62 + 7.91 + 10.12 + 13.92))))))^15-16-Φ)-1))^2-1/5

Input

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{2}\left(\left(1+1\Big/\left(\frac{1}{2e}\left(\frac{1}{7}(6.74+7.95+6.16+6.62+7.91+10.12+13.92)\right)\right)\right)+\frac{98}{6.74+7.95+6.16+6.62+7.91+10.12+13.92}\right)\right)^{15}-16-\Phi\right)-1\right)^2-\frac{1}{5}$$

Φ is the golden ratio conjugate

Result

4096.01…

4096.01…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson.

This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Now let's start from the date of the **Lisbon earthquake of November 1, 1755**.

The **Lisbon earthquake of 1755** was a large one that occurred on the morning of November 1st with hypocenter not far from Lisbon, the capital of Portugal.

Let's add 14 Saros cycles to that date:

November 1, 1755 + 252 years 159 days 1 hour 48 minutes

Input interpretation

Saturday, November 1, 1755 + 252 years 159 days 1 hour 48 minutes

Result

1:48 am CEST | Tuesday, April 8, 2008

To this date we add two lines of complete rotations of the apses (2*8.85 years = 17.70 years) and subtract one lunar year:

Apr 8, 2008 + 17.70 years - 354 days 8 hours 48 minutes 36 seconds

Input interpretation

(Tuesday, April 8, 2008 + 17.7 years) – 354 days 8 hours 48 minutes 36 seconds

Result

3:11:24 am CET | Monday, December 30, 2024

From this date we subtract a lunar quarter:

Dec 30, 2024 - 118 days 2 hours 56 minutes 12 seconds

Input interpretation

Monday, December 30, 2024 – 118 days 2 hours 56 minutes 12 seconds

Result

9:03:48 pm CEST | Monday, September 2, 2024

02.09.2024

Or, taking the dates of the following eclipses:

06/09/1755	9.05	Eclisse totale.	Meridionale	5.40	18.36

Let's add two synodic months:

September 6, 1755 + 59 days 1 hour 28 minutes 6 seconds

Input interpretation

Saturday, September 6, 1755 + 59 days 1 hour 28 minutes 6 seconds

Result

1:28:06 am LMT | Tuesday, November 4, 1755

04.11.1755

And from the following date:

02/10/2024	19.46	Eclisse anulare.	Meridionale	6.08	17.49

Subtracting a synodic month:

October 2, 2024 - 29 days 12 hours 44 minutes 3 seconds

Input interpretation

Wednesday, October 2, 2024 – 29 days 12 hours 44 minutes 3 seconds

Result

11:15:57 am CEST | Monday, September 2, 2024

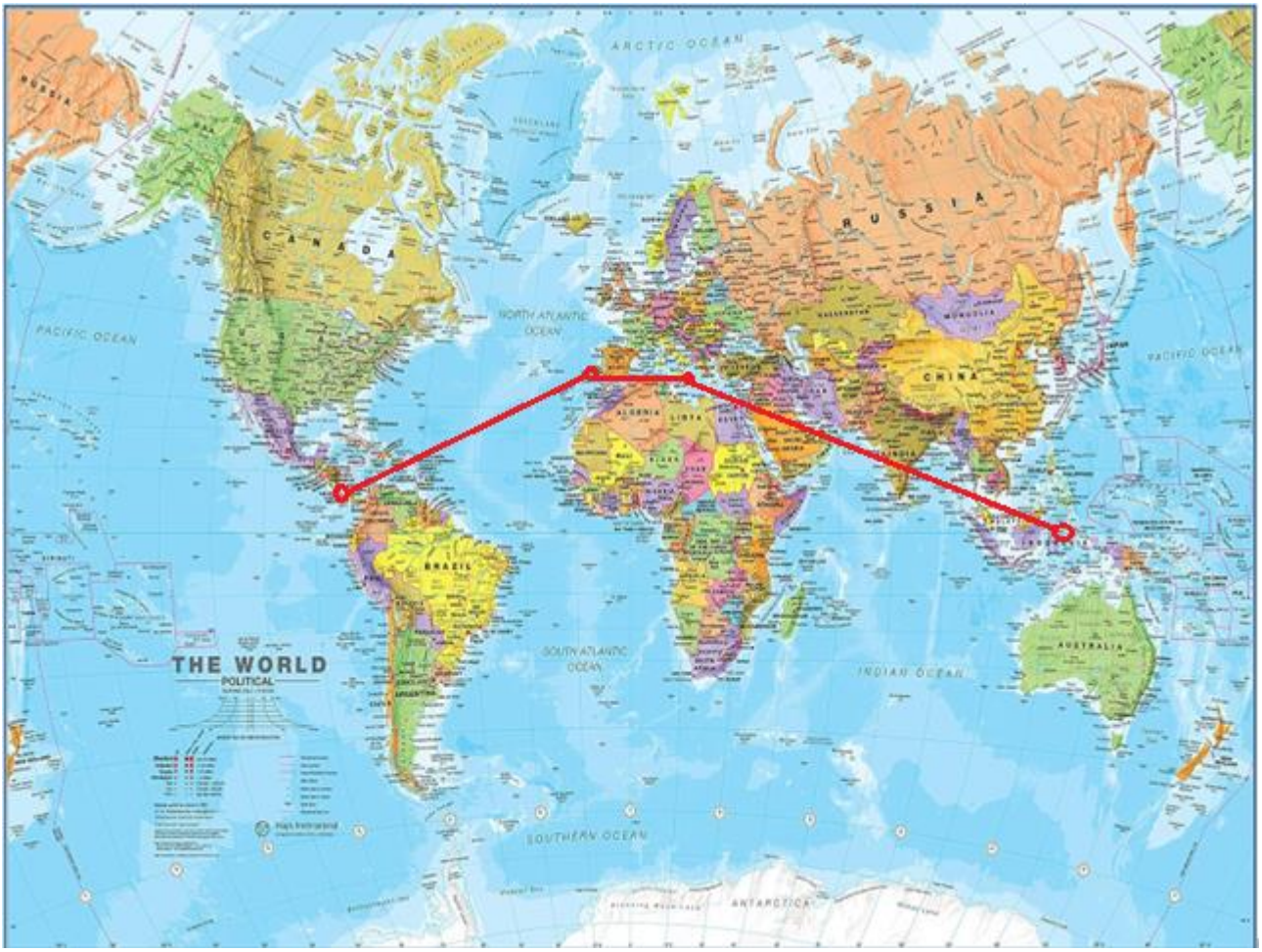
02.09.2024

August 26, 2024

An earthquake measuring 5.3 on the Richter scale was recorded in the early hours of this morning off the coast of the city of Sines, and the tremor was also felt in Lisbon. According to data from the Portuguese Institute of the Sea and the Atmosphere (IPMA), the earthquake had its epicenter in the Atlantic, 70 km southwest of Sesimbra. According to the Portuguese institute, the tremor was felt in Portugal, Spain and Morocco. “Three other aftershocks of the earthquake felt at 5:11 have already been felt, with values of 1.2, 1.1 and 0.9 on the Richter scale,” said André Fernandes, national commander of the Civil Protection. “It is a perfectly normal situation and we are now in a monitoring phase.”

Data e Ora (Italia)	**Magnitudo**	**Zona**
2024-08-27 14:47:43	ML 3.9	Mar Ionio Settentrionale (MARE)
2024-08-27 05:39:49	ML 2.9	Tirreno Meridionale (MARE)
2024-08-27 04:15:20	**Mwp 5.8**	**Indonesia [Sea]**
2024-08-26 15:14:15	ML 2.1	4 km SW Serravalle di Chienti (MC)
2024-08-26 11:47:42	ML 2.3	3 km SE Fontanelice (BO)
2024-08-26 07:08:45	**Mwp 5.8**	**South of Panama [Sea: Panama]**
2024-08-26 06:34:38	ML 2.0	3 km W Apricena (FG)
2024-08-26 06:11:38	**mb 5.0**	**Portugal [Sea]**
2024-08-26 03:34:32	ML 2.2	4 km SE Castel del Rio (BO)
2024-08-26 03:05:44	ML 2.0	Confine Italia Svizzera (SVIZZERA)
2024-08-26 02:02:06	ML 2.4	Borgo Tossignano (BO)

Data e Ora (Italia)	Magnitudo	Zona
2024-08-26 01:53:02	ML 2.3	2 km N Borgo Tossignano (BO)
2024-08-26 01:45:43	ML 3.9	3 km SE Castel del Rio (BO)
2024-08-26 01:29:09	**Mwp 6.8**	**Tonga Islands [Sea: Tonga]**



On **February 16, 1861**, there was a very violent earthquake in Sumatra, Indonesia. These are the lunar phases of that period:

9 February 1861 20:04:38 New Moon 21°07'47 396863.84 km

18 February 1861 00:19:42 First Quarter 29°23'17 398290.59 km

A tale data aggiungiamo 1 Ciclo di Saros e sottraiamo 2 mesi sinodici:

february 16, 1861 + 108 years 68 days 4 hours 12 minutes - 58.54 days

Input interpretation

(Saturday, February 16, 1861 + 108 years 68 days 4 hours 12 minutes) –
58.540 days

Result

3:14:24 pm CET | Tuesday, February 25, 1969

This date (February 25, 1969) is very close to the date of **February 28, 1969**, when there was a strong earthquake that hit Portugal and Morocco.

March 4, 1969 05:17:03 Full Moon 13°27'39 387679.14 km

Let's add to this date 3 Saros cycles:

February 25, 1969+54 years 34 days 2 hours 6 minutes

Input interpretation

Tuesday, February 25, 1969 + 54 years 34 days 2 hours 6 minutes

Result

2:06 am CEST | Friday, March 31, 2023

We note that:

20/04/2023	5.24	Eclisse totale.	Meridionale	5.23	18.56

Adding to the date obtained above 5 synodic months:

March 31, 2023 + 146 days 8 hours 24 minutes

Input interpretation

Friday, March 31, 2023 + 146 days 8 hours 24 minutes

Result

8:24 am CEST | Thursday, August 24, 2023

To that date, adding 1 lunar year, we get:

August 24, 2023 + 354 days 8 hours 48 minutes 36 seconds

Input interpretation

Thursday, August 24, 2023 + 354 days 8 hours 48 minutes 36 seconds

Result

8:48:36 am CEST | Monday, August 12, 2024

Doing the same calculation with the date of the eclipse:

April 20, 2023 + 146 days 8 hours 24 minutes

Input interpretation

Thursday, April 20, 2023 + 146 days 8 hours 24 minutes

Result

8:24 am CEST | Wednesday, September 13, 2023

Adding to this date a synodic year:

September 13, 2023 + 354 days 8 hours 48 minutes 36 seconds

Input interpretation

Wednesday, September 13, 2023 + 354 days 8 hours 48 minutes 36 seconds

Result

8:48:36 am CEST | Sunday, September 1, 2024

Both dates, **August 12** and **September 1, 2024**, are close to **August 26, 2024**, the date of the 5.3 magnitude earthquake that occurred in Portugal.

August 26, 2024 09:25:50 Last quarter 03°38'10 376666.64 km

September 3, 2024 01:55:34 New Moon 11°04'12 403894.36 km

Let's go back to the date of November 1, 1755 (Lisbon Earthquake). Here is the lunar phase of that period:

November 4, 1755 03:08:41 New Moon 11°24'50 356902.18 km

Let's add to it 5 Saros cycles:

November 1, 1755 + 90 years 56 days 19 hours 30 minutes

Input interpretation

Saturday, November 1, 1755 + 90 years 56 days 19 hours 30 minutes

Result

7:30 pm LMT | Saturday, December 27, 1845

Adding 1 Saros cycle to the result obtained:

December 27, 1845 + 18 years, 11 days, 8 hours and 42 minutes

Input interpretation

Saturday, December 27, 1845 + 18 years 11 days 8 hours 42 minutes

Result

8:42 am LMT | Thursday, January 7, 1864

Subtracting 3 synodic years from the above result, we obtain:

January 7, 1864 - 1063 days 2 hours 25 minutes 48 seconds

Input interpretation

Thursday, January 7, 1864 – 1063 days 2 hours 25 minutes 48 seconds

Result

9:34:12 pm LMT | Thursday, February 7, 1861

Result close to the date of **February 16, 1861**, in which there was a very violent earthquake in Sumatra (Indonesia)

February 9, 1861 20:04:38 New Moon 21°07'47 396863.84 km

February 18, 1861 00:19:42 First quarter 29°23'17 398290.59 km

Let's now analyze these additional earthquakes, which occurred close to eclipse dates, in the Urbino area (Marche):

14/04/1828	10.24	Eclisse totale.	Settentrionale	5.32	18.50

1828. ***Aprile, notte dal 13 al 14.*** **Fortissimo.**

01/02/1851	6.57	Eclisse anulare.	Meridionale	7.24	17.25

1851. ***11 Febbraio.*** **Il conte Domenico Paoli da Pesaro mi scrisse che ivi ebbero a ore 5. 11' circa (credo pomeridiane) una piccola scossa di terremoto.**

1851. ***28 Maggio, 9 pom.*** **Terremoto della vigilia dell'Ascensione. Fu sentito anche a Cortona e a Castiglione (presso Cortona) qualche minuto prima delle 9 pom., nella direzione da N a S, e con mediocre intensità. Lo sentirono anche Siena, Firenze, Lucca.**

06/06/1853	21.07	Eclisse anulare.	Meridionale	4.35	19.42

1853. *22 Giugno, 0. 28' ant.* Assai gagliardo.

26/05/1854	21.46	Eclisse anulare.	Settentrionale	4.41	19.33

1854. *22 Maggio, 3. 36' pom.* Due leggiere scosse di 2" l'una, coll'intervallo di forse 2". Qualcuno crede aver notata la direzione verso NE.

1854. *16 Giugno, 2. 31' pom.* Terremoto per circa 8" ondulatorio per SW-NE. È cominciato con movimento sussultorio, e poi un momento quietò, e poi riprese per 2" o 3. Il vento SW rinforzò dopo il terremoto. È stato sentito anche a Bologna.

29/09/1856	4.58	Eclisse anulare.	Settentrionale	6.05	17.55

1856. *31 Agosto, 3. 37' ant.* Terremoto piuttosto lungo da E a W. Il barometro è alto, e alza sempre più.

1856. *12 Ottobre, 2. 0 ant.* Prolungato, ma non forte.

25/03/1857	23.30	Eclisse totale.	Meridionale	6.05	18.28
18/09/1857	6.36	Eclisse anulare.	Settentrionale	5.53	18.15

1857. *15 Marzo, 6. 45' (ant.?).* Scossa ondulatoria sentita da parecchi da E a W.

1857. *3 Settembre, 5. 0 ant.* Ondulatorio.

18/07/1860	15.24	Eclisse totale.	Settentrionale	4.50	19.41

1860. *15 Luglio, 2. 3/4 ant.* Cinque piccole ondulazioni.

31/12/1861	14.50	Eclisse totale.	Settentrionale	7.38	16.49

1861. *7 Dicembre, 10. 1/2 ant.* Prima scossa per 4 secondi, che ha fatto sonare qualche campanello; ondulatoria, nella direzione probabile da E a W, seguita da una seconda assai più debole.

1861. *8 Dicembre, 5. 1/2 ant.* Si ripete un piccolo terremoto. È curioso che questa ripetizione si fa in ordine al tempo come nel marzo.

19/10/1865	17.21	Eclisse anulare.	Settentrionale	6.27	17.23

1865. *24 Settembre, 11. 1/2 ant.* Piuttosto forte, ma breve.

06/03/1867	10.48	Eclisse anulare.	Settentrionale	6.38	18.06

1867. *29 Marzo, 7. 25' pom.* Urto assai violento, seguito da un nuovo urto più debole; e poi agitazione vaga crescente per circa 5''. La direzione prevalente sembrò da W a E.

1867. *30 Marzo, 4. 10' ant.* Altra minima scossa sentita da pochi.

18/08/1868	6.12	Eclisse totale.	Meridionale	5.21	19.05

1868. *2 Agosto, 10. 15' pom.* Lieve.

1868. *26 Agosto, 8. 42' ant.* Ondulatorio per 8", con piccola tregua dopo i primi quattro.

31/01/1870	16.31	Eclisse parziale. Magnitud. = 0,47	Meridionale	7.24	17.24
29/06/1870	0.45	Eclisse parziale. Magnitud. = 0,64	Meridionale	4.37	19.49
22/12/1870	13.31	Eclisse totale.	Settentrionale	7.35	16.43

1870. *8 Febbraio, 5. o pom. circa.* Forte scossa preceduta da romba sotterranea. Ha fatto sonare qualche campanello.

1870. *1 Marzo, 8. 40' pom.* Due scosse assai sensibili.

1870. *24 Giugno, 6. o pom. circa.* Due scosse ondulatorie; la prima leggiera, la seconda più sensibile, però avvertite da pochi.

1870. *21 Novembre, 0. 15' ant.* Ondulatorio.

22/12/1870	13.31	Eclisse totale.	Settentrionale	7.35	16.43

1871. *6 Gennaio, 11. o pom. circa.* Terremoto.

18/06/1871	3.34	Eclisse anulare.	Meridionale	4.34	19.48

1871. *2 Giugno, 10. 45' pom.* Terremoto.

30/11/1872	19.26	Eclisse totale.	Meridionale	7.18	16.40

1872. *2 Novembre, 1. 26' pom.* Due scosse ondulatorie, con un minuto d'intervallo. La prima più forte durò circa 6", la seconda circa 4".

26/05/1873	10.13	Eclisse parziale. Magnitud. = 0,89	Settentrionale	4.40	19.34

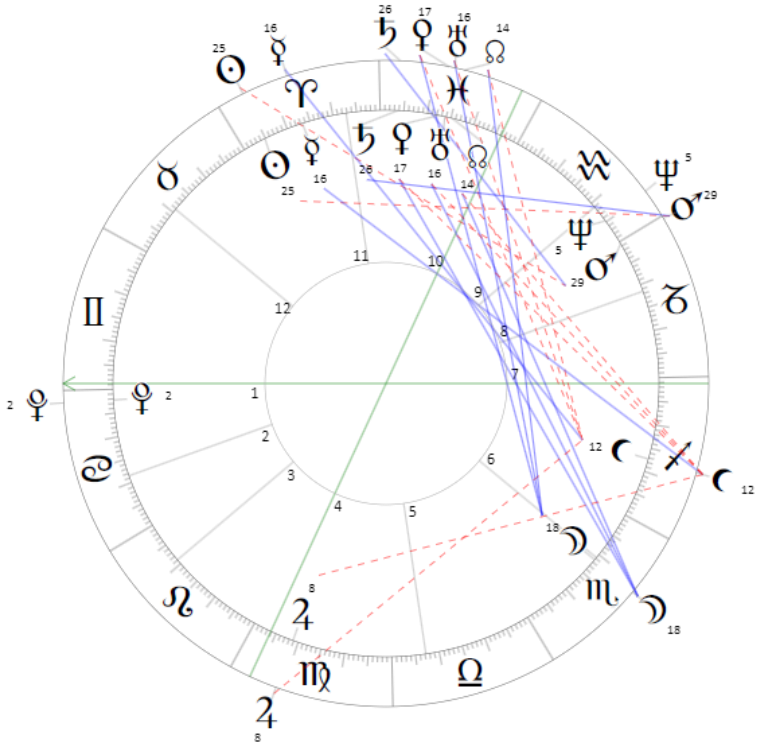
1873. *7 Maggio, 8. 11' ant.* Lieve scossa sentita da pochissimi. Alla stessa ora fu sentito distintamente a Cagli.

1873. *20 Maggio, 4. 45' ant.* A Macerata (Marche) forte scossa, ma di breve durata.

April 14, 1672 strong earthquake in Rimini

28/02/1672	15.51	Eclisse anulare.	Meridionale	6.48	17.59

March 6, 1672 → Jupiter opposition



Luna → Urano-Venere

April, 14 1672 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Thursday, April 14, 1672 (Gregorian calendar) +
108 years 68 days 4 hours 12 minutes

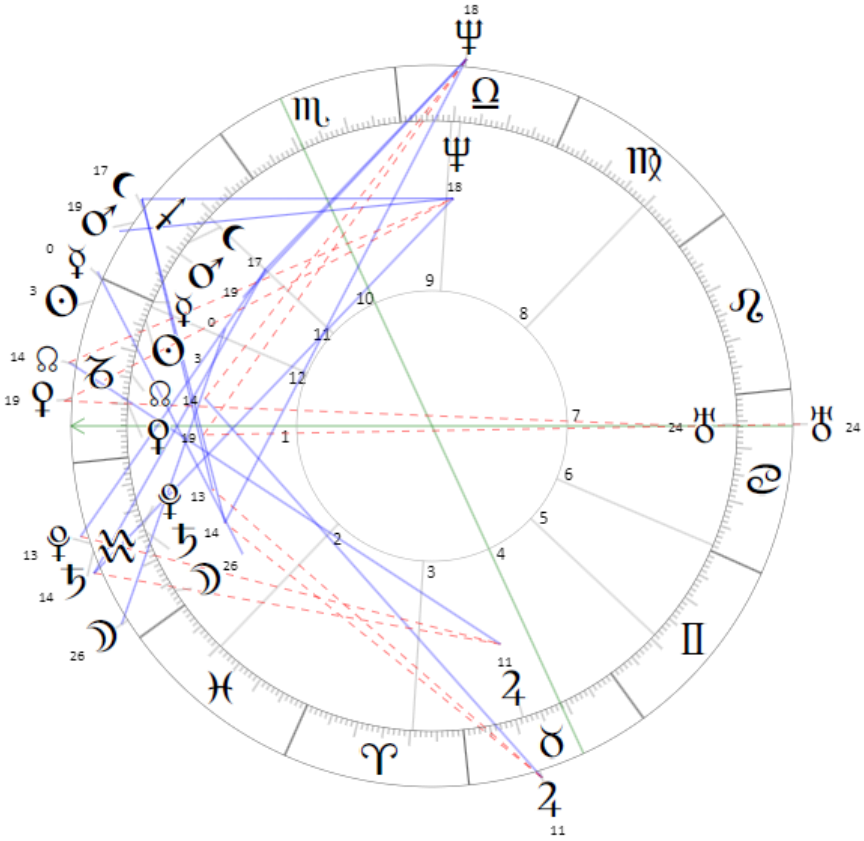
Result

4:12 am LMT | Wednesday, June 21, 1780

December 25, 1786 strong earthquake in Rimini

20/12/1786	18.03	Eclisse parziale. Magnitud. = 0,07	Meridionale	7.34	16.42

January 4, 1787 - Inferior Conjunction of Venus



Luna → Plutone-Saturno ; Giove → Venere ; Urano → Venere ; Nettuno → Venere

Giove → Urano → Nettuno → Venere

December 25, 1786 + 108 years 68 days 4 hours 12 minutes

Input interpretation

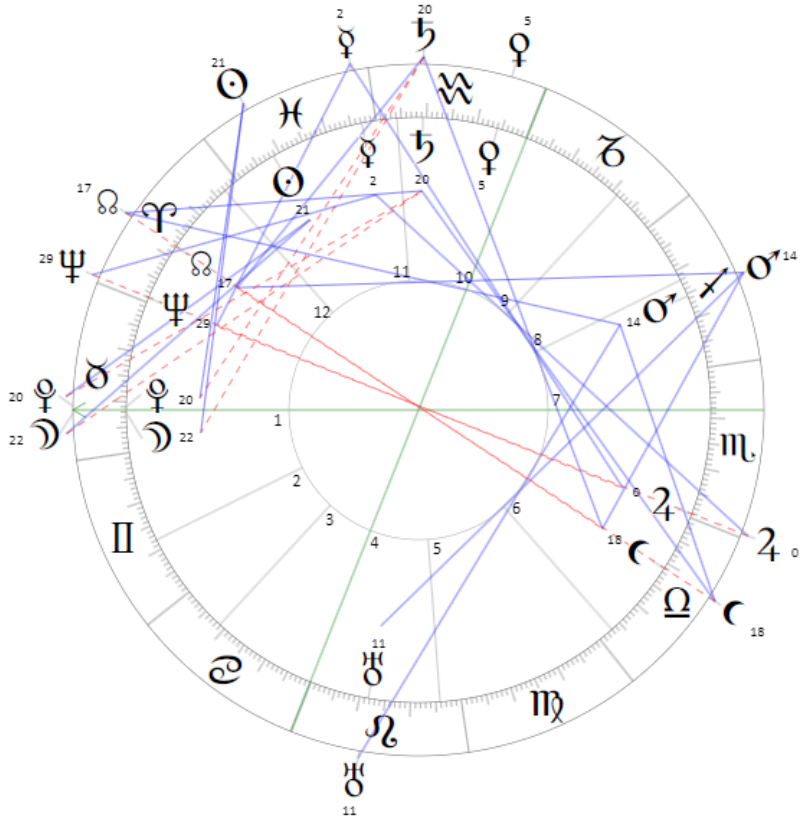
Monday, December 25, 1786 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CET | Sunday, March 3, 1895

March 12, 1875 strong earthquake in Rimini

06/04/1875	7.37	Eclisse totale.	Meridionale	5.45	18.40



Saturno → Luna ; Giove → Nettuno

March, 12 1875 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Friday, March 12, 1875 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CEST | Thursday, May 19, 1983

April, 14 1672 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Thursday, April 14, 1672 (Gregorian calendar) +
108 years 68 days 4 hours 12 minutes

Result

4:12 am LMT | Wednesday, June 21, 1780

June 21, 1780 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Wednesday, June 21, 1780 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am RMT | Tuesday, August 28, 1888

August 28, 1888 + 108 years 68 days 4 hours 12 minutes

Input interpretation

Tuesday, August 28, 1888 + 108 years 68 days 4 hours 12 minutes

Result

4:12 am CET | Monday, November 4, 1996

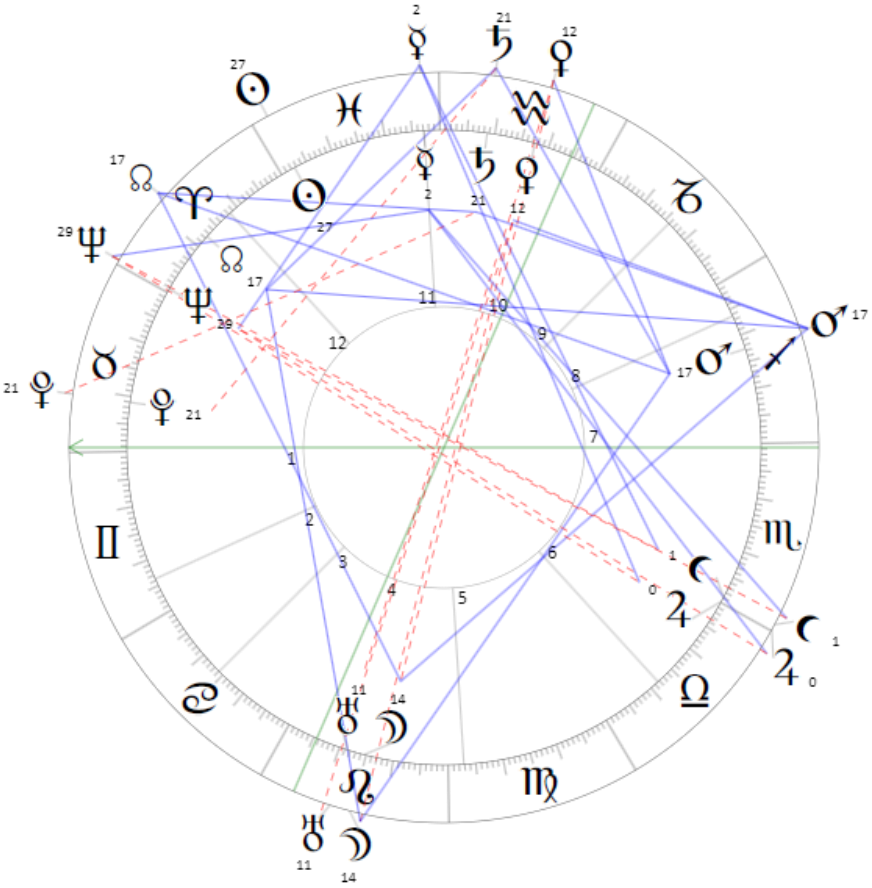
On the earthquake of March 17-18, 1875

Moon phases:

March 14, 1875 13:05:40 First quarter 23°34'14 373234.63 km

March 21, 1875 23:51:50 Full Moon 00°58'17 398418.84 km

Transit sky of Thursday, March 18, 1875 at 08:00:00, Rome, Italy



Venere-Luna ; Giove-Nettuno ; Mercurio-Giove ; Venere-Urano

Mercurio-Saturno-Giove; → Venere-Luna-Urano ; Mercurio-Saturno-Giove

Lisbona 38°42′N 9°11′W

Sumatra 3°35′N 98°40′E

Rimini 44°03′34″N 12°34′06″E

2*(23°34'14")-2((2sqrt2)/Pi)°

Input interpretation

$$2\,(23\text{ degrees}\quad 34\text{ arcminutes}\quad 14\text{ arcseconds}) - 2\times\frac{2\sqrt{2}}{\pi}\,^\circ\ \text{(degrees)}$$

Results

45 degrees 20 arcminutes 25.72 arcseconds

1/2(23°34'14")+((2√2)/Pi)°

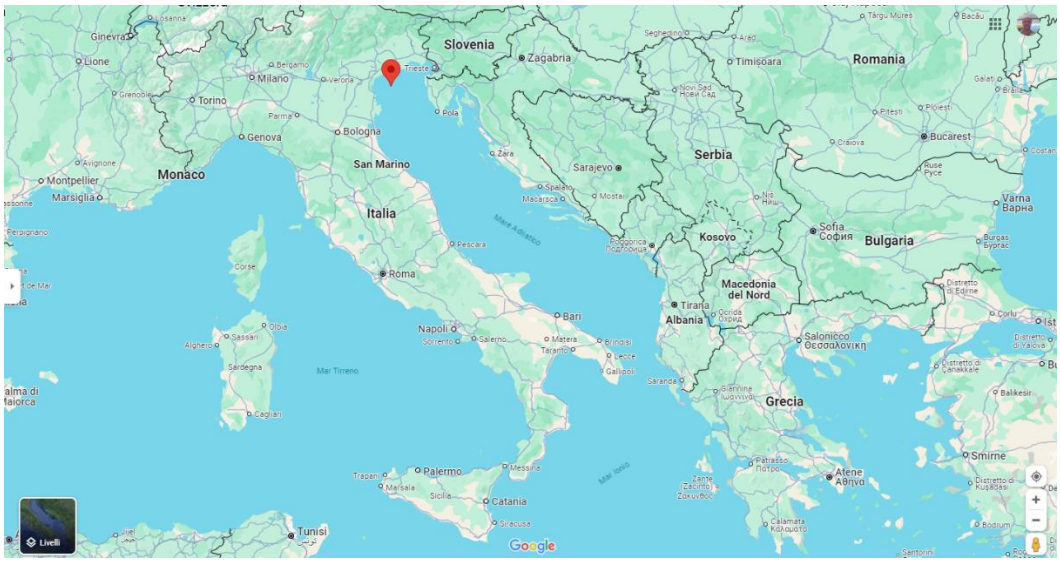
Input interpretation

$$\frac{1}{2}\,(23\text{ degrees}\quad 34\text{ arcminutes}\quad 14\text{ arcseconds}) + \frac{2\sqrt{2}}{\pi}\,^\circ\ \text{(degrees)}$$

Results

12 degrees 41 arcminutes 8.139 arcseconds

45°20'00.0"N 12°41'00.0"E (sea in front of Jesolo)



((29° 23') - (21° 07'))/2 - ((2sqrt2)/Pi)°

Input interpretation

$$\frac{1}{2}(29\text{ degrees }\ 23\text{ arcminutes} - 21\text{ degrees }\ 7\text{ arcminutes}) - \frac{2\sqrt{2}}{\pi}° \text{ (degrees)}$$

Results

3 degrees 13.98 arcminutes

2((29° 23') + (21° 07'))-((2sqrt2)/Pi)°

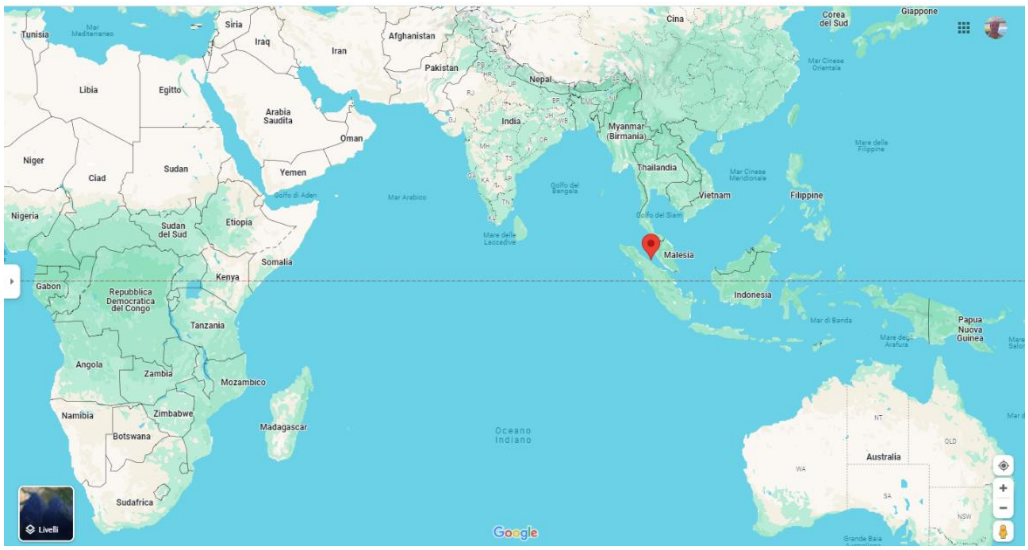
Input interpretation

$$2(29\text{ degrees }\ 23\text{ arcminutes} + 21\text{ degrees }\ 7\text{ arcminutes}) - \frac{2\sqrt{2}}{\pi}° \text{ (degrees)}$$

Results

100 degrees 5.981 arcminutes

3°14'00.0"N 100°06'00.0"E (Straits of Malacca)



3*(11°24')+5((2sqrt2)/Pi)°

Input interpretation

$$3\,(11 \text{ degrees } \ 24 \text{ arcminutes}) + 5\times\frac{2\sqrt{2}}{\pi}\,^\circ \text{ (degrees)}$$

Results

38 degrees 42.09 arcminutes

(11°24')-2((2sqrt2)/Pi)°

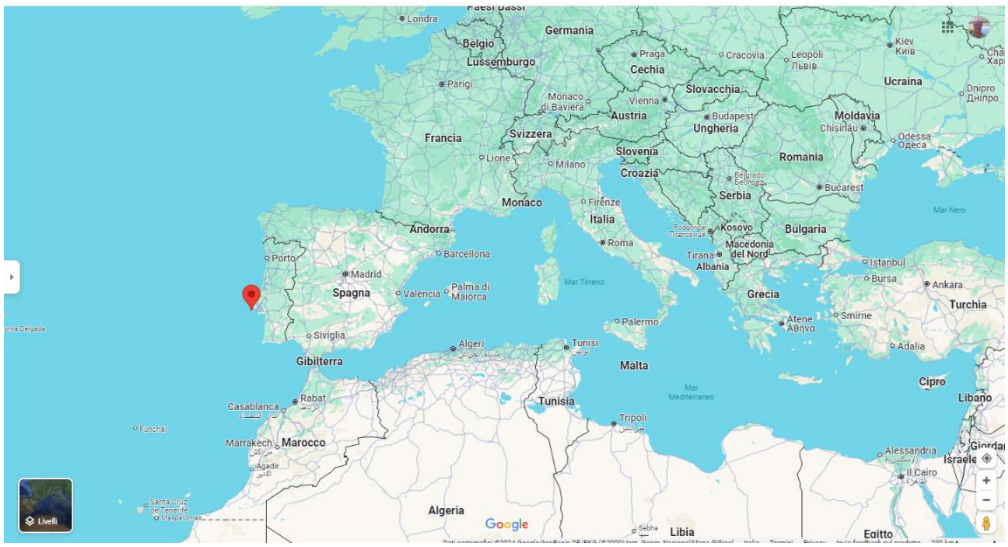
Input interpretation

$$11 \text{ degrees } \ 24 \text{ arcminutes} - 2\times\frac{2\sqrt{2}}{\pi}\,^\circ \text{ (degrees)}$$

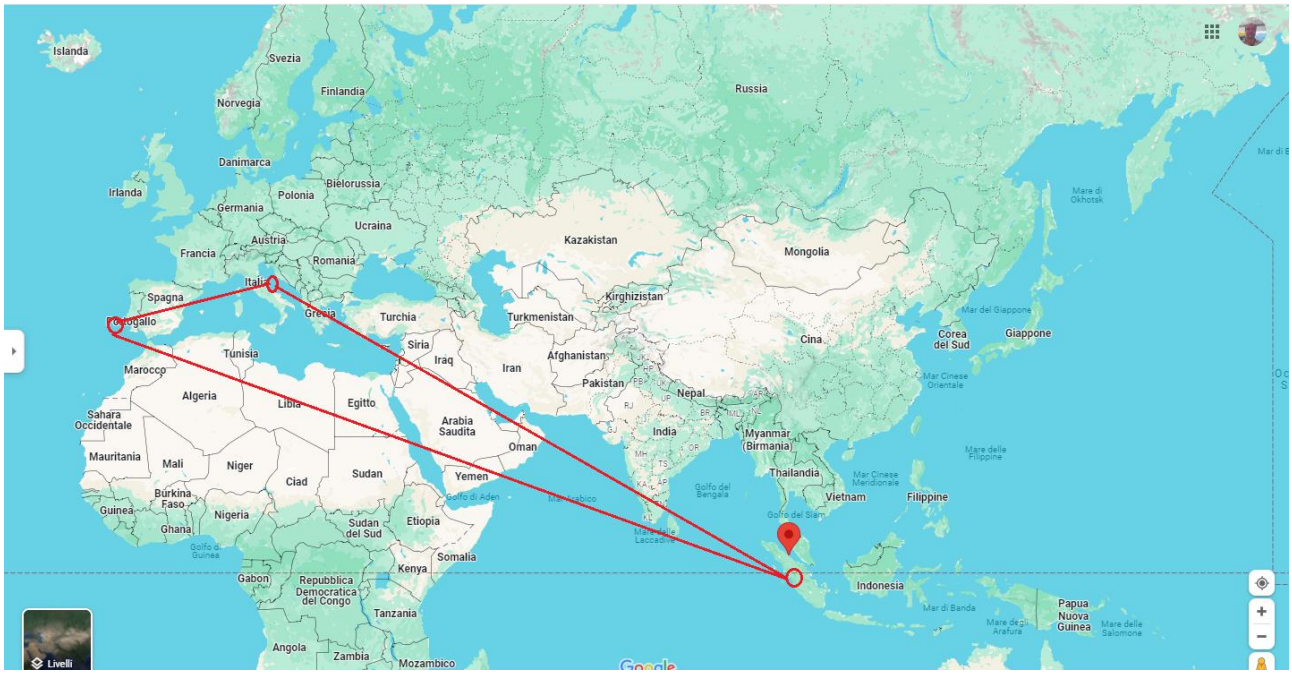
Results

9 degrees 35.96 arcminutes

38°42'00.0"N 9°36'00.0"W North Atlantic Ocean (off Lisbon)



Calculated seismic radiant map



Real seismic events map

We note that from the previous three expressions, we obtain:

2*(23°34'14")-2((x))° = 45.34°

Input interpretation

$$2\,(23 \text{ degrees } 34 \text{ arcminutes } 14 \text{ arcseconds}) - 2\times x° \text{ (degrees)} = 45.34° \text{ (degrees)}$$

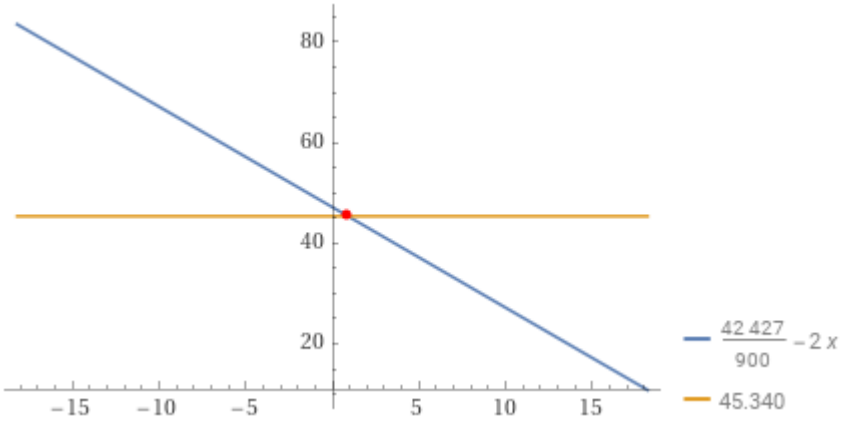
Result

$$\frac{1}{3600}\left(60\,\text{int}\left(60\,\text{frac}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right) + \text{int}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right)\right) + \text{frac}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right)\right) + 3600\,\text{int}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right) = 45.340$$

frac(x) is the fractional part function

int(x) is the integer part function

Plot



Alternate form assuming x is real

$$2.000\,x = 1.801$$

Alternate forms

$$\frac{42\,427}{900} - 2\,x = 45.340$$

$$60.00\,\text{int}\left(60\,\text{frac}\left(\frac{1}{900}\,(42\,427 - 1800\,x)\right)\right) + 1.0000\,\text{int}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{1}{900}\,(42\,427 - 1800\,x)\right)\right)\right) + 1.0000\,\text{frac}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{1}{900}\,(42\,427 - 1800\,x)\right)\right)\right) + 3600.0\,\text{int}\left(\frac{1}{900}\,(42\,427 - 1800\,x)\right) = 1.6322\times 10^5$$

Expanded forms

$$\frac{1}{60}\,\text{int}\left(60\,\text{frac}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right) + \frac{\text{int}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right)\right)}{3600} + \frac{\text{frac}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{169\,708 - 7200\,x}{3600}\right)\right)\right)}{3600} + \text{int}\left(\frac{169\,708 - 7200\,x}{3600}\right) = 45.340$$

$$\frac{1}{60}\,\text{int}\left(60\,\text{frac}\left(\frac{42\,427}{900}-2x\right)\right)+\frac{\text{int}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{42\,427}{900}-2x\right)\right)\right)}{3600}+\frac{\text{frac}\left(60\,\text{frac}\left(60\,\text{frac}\left(\frac{42\,427}{900}-2x\right)\right)\right)}{3600}+\text{int}\left(\frac{42\,427}{900}-2x\right)=45.340$$

Solution

$x \approx 0.90034$

0.90034

From which:

1/3*(2/0.90034)^2

Input

$$\frac{1}{3}\left(\frac{2}{0.90034}\right)^2$$

Result

1.64484752654655897587392701108220807517046360481678116844239939 87
…

1.644847526546…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

(1/3*(2/0.90034)^2)^15-16-1/π

Input

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}$$

Result

1729.04…

1729.04….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2.

Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternative representations

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = -16 - \frac{1}{180^\circ} + \left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = -16 - -\frac{1}{i\log(-1)} + \left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = -16 - \frac{1}{\cos^{-1}(-1)} + \left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = 1729.36 - \frac{1}{4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = 1729.36 + \frac{1}{2 - 2\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = 1729.36 - \frac{1}{\sum_{k=0}^{\infty} \frac{2^{-k}\,(-6+50\,k)}{\binom{3k}{k}}}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = 1729.36 - \frac{1}{2\int_0^{\infty} \frac{1}{1+t^2}\,dt}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = 1729.36 - \frac{1}{4\int_0^{1} \sqrt{1-t^2}\,dt}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi} = 1729.36 - \frac{1}{2\int_0^{\infty} \frac{\sin(t)}{t}\,dt}$$

(1/27(((1/3*(2/0.90034)^2)^15-16-1/π)-1))^2-1/5

Input

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15} - 16 - \frac{1}{\pi}\right) - 1\right)\right)^2 - \frac{1}{5}$$

Result

4095.99…

4095.99…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192.

The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, $SO(2^{13})$ i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternative representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=$$
$$-\frac{1}{5}+\left(\frac{1}{27}\left(-17-\frac{1}{180^\circ}+\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=$$
$$-\frac{1}{5}+\left(\frac{1}{27}\left(-17--\frac{1}{i\log(-1)}+\left(\frac{1}{3}\left(\frac{2}{0.90034}\right)^2\right)^{15}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\right.$$
$$\left.-\frac{1}{5}+\left(\frac{1}{27}\left(-17-\frac{1}{\cos^{-1}(-1)}+\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}\right)\right)\right)^2\right.$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\right.$$
$$\left.-\frac{1}{5}+\frac{1}{729}\left(-1728.36+\frac{1}{\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50\,k)}{\binom{3k}{k}}}\right)^2\right.$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\right.$$
$$\frac{4097.5\left(-0.000145664+\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}\right)\left(-0.000143642+\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}\right)}{\left(\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2\,k}\right)^2}$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\right.$$
$$\frac{4097.5\left(-1.00029+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)\left(-1.00029+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)}{\left(-1+\sum_{k=1}^{\infty}\frac{2^k}{\binom{2k}{k}}\right)^2}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\frac{4097.5\left(-0.000291327+\int_0^\infty \frac{1}{1+t^2}\,dt\right)\left(-0.000287285+\int_0^\infty \frac{1}{1+t^2}\,dt\right)}{\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2}$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\frac{4097.5\left(-0.000291327+\int_0^\infty \frac{\sin(t)}{t}\,dt\right)\left(-0.000287285+\int_0^\infty \frac{\sin(t)}{t}\,dt\right)}{\left(\int_0^\infty \frac{\sin(t)}{t}\,dt\right)^2}$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90034}\right)^2\right)^{15}-16-\frac{1}{\pi}\right)-1\right)\right)^2-\frac{1}{5}=\frac{4097.5\left(-0.000145664+\int_0^1 \sqrt{1-t^2}\,dt\right)\left(-0.000143642+\int_0^1 \sqrt{1-t^2}\,dt\right)}{\left(\int_0^1 \sqrt{1-t^2}\,dt\right)^2}$$

((29° 23') - (21° 07'))/2 - (x)° = 3.233°

Input interpretation

$$\frac{1}{2}(29\text{ degrees }\ 23\text{ arcminutes} - 21\text{ degrees }\ 7\text{ arcminutes}) - x^\circ\ \text{(degrees)} = 3.233^\circ\ \text{(degrees)}$$

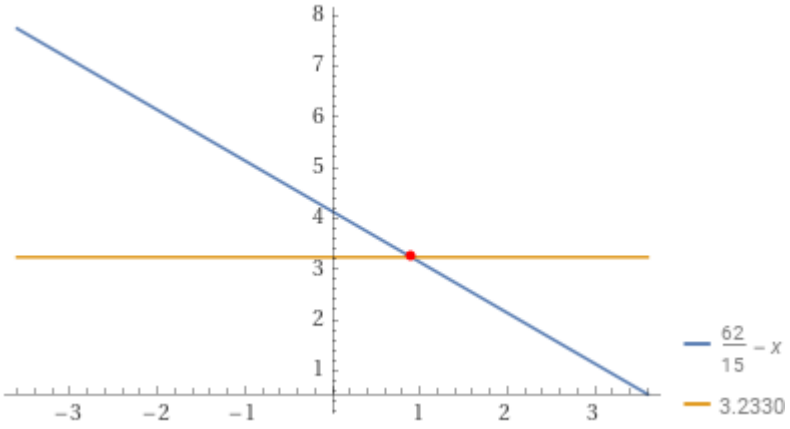
Result

$$\frac{1}{60}\left(\text{int}\left(60\,\text{frac}\left(\frac{1}{60}(248-60x)\right)\right)+\text{frac}\left(60\,\text{frac}\left(\frac{1}{60}(248-60x)\right)\right)+60\,\text{int}\left(\frac{1}{60}(248-60x)\right)\right)=3.2330$$

frac(x) is the fractional part function

int(x) is the integer part function

Plot



Alternate forms

$$\frac{62}{15} - x = 3.2330$$

$$1.0000\,\text{int}\left(60\,\text{frac}\left(\frac{1}{15}(62 - 15x)\right)\right) + 1.0000\,\text{frac}\left(60\,\text{frac}\left(\frac{1}{15}(62 - 15x)\right)\right) + 60.00\,\text{int}\left(\frac{1}{15}(62 - 15x)\right) = 193.98$$

Expanded forms

$$\frac{1}{60}\,\text{int}\left(60\,\text{frac}\left(\frac{1}{60}(248 - 60x)\right)\right) + \frac{1}{60}\,\text{frac}\left(60\,\text{frac}\left(\frac{1}{60}(248 - 60x)\right)\right) + \text{int}\left(\frac{1}{60}(248 - 60x)\right) = 3.2330$$

$$\frac{1}{60}\,\text{int}\left(60\,\text{frac}\left(\frac{62}{15} - x\right)\right) + \frac{1}{60}\,\text{frac}\left(60\,\text{frac}\left(\frac{62}{15} - x\right)\right) + \text{int}\left(\frac{62}{15} - x\right) = 3.2330$$

Solution

$x \approx 0.90032$

0.90032

From which:

1/3*(2/0.90032)^2

Input

$$\frac{1}{3}\left(\frac{2}{0.90032}\right)^2$$

Result

1.64492060570935150892172827686528811897691265235767865308994993 30
…

1.6449206057…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

(1/3*(2/0.90032)^2)^15-16-π/2

Input

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2}$$

Result

1728.95…

1728.95….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternative representations

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = -16 - 90^\circ + \left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = -16 + \frac{1}{2}\, i \log(-1) + \left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = -16 - E(0) + \left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$E(m)$ is the complete elliptic integral of the second kind with parameter $m = k^2$

Series representations

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = 1730.52 - 2\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = 1731.52 - \sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = 1730.52 - \sqrt{3}\sum_{k=0}^{\infty} \frac{\left(-\frac{1}{3}\right)^k}{1+2k}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = 1730.52 - \int_0^\infty \frac{1}{1+t^2}\,dt$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = 1730.52 - 2\int_0^1 \sqrt{1-t^2}\,dt$$

$$\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2} = 1730.52 - \int_0^\infty \frac{\sin(t)}{t}\,dt$$

(1/27(((1/3*(2/0.90032)^2)^15-16-π/2)-1))^2+1/5

Input

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15} - 16 - \frac{\pi}{2}\right) - 1\right)\right)^2 + \frac{1}{5}$$

Result

4095.97…

4095.97…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson.

This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

Alternative representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=\frac{1}{5}+\left(\frac{1}{27}\left(-17-90^\circ+\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=\frac{1}{5}+\left(\frac{1}{27}\left(-17+\frac{1}{2}\,i\log(-1)+\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}\right)\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=\frac{1}{5}+\left(\frac{1}{27}\left(-17-E(0)+\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}\right)\right)^2$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$E(m)$ is the complete elliptic integral of the second kind with parameter $m = k^2$

Series representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=\frac{1}{5}+0.000342936\left(-3459.04+x+2\sum_{k=1}^{\infty}\frac{\sin(k\,x)}{k}\right)^2 \quad \text{for } (x\in\mathbb{R} \text{ and } x>0)$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=\frac{1}{5}+0.000342936\left(-3459.04+\sum_{k=0}^{\infty}\frac{2^{-k}\,(-6+50\,k)}{\binom{3\,k}{k}}\right)^2$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=\frac{1}{5}+0.00137174\left(-1729.52+\sqrt{3}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{3}\right)^k}{1+2\,k}\right)^2$$

$\mathbb{R}$ is the set of real numbers

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=0.00137174\left(2.99139\times10^6-3459.04\int_0^{\infty}\frac{1}{1+t^2}\,dt+\left(\int_0^{\infty}\frac{1}{1+t^2}\,dt\right)^2\right)$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=0.00137174\left(2.99139\times10^6-3459.04\int_0^{\infty}\frac{\sin(t)}{t}\,dt+\left(\int_0^{\infty}\frac{\sin(t)}{t}\,dt\right)^2\right)$$

$$\left(\frac{1}{27}\left(\left(\left(\frac{1}{3}\left(\frac{2}{0.90032}\right)^2\right)^{15}-16-\frac{\pi}{2}\right)-1\right)\right)^2+\frac{1}{5}=$$
$$0.00548697\left(747848.-1729.52\int_0^1\sqrt{1-t^2}\,dt+\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2\right)$$

3*(11°24')+5(x)° = 38.7°

Input interpretation

$$3\,(11\text{ degrees }\ 24\text{ arcminutes})+5\times x°\ \text{(degrees)}=38.7°\ \text{(degrees)}$$

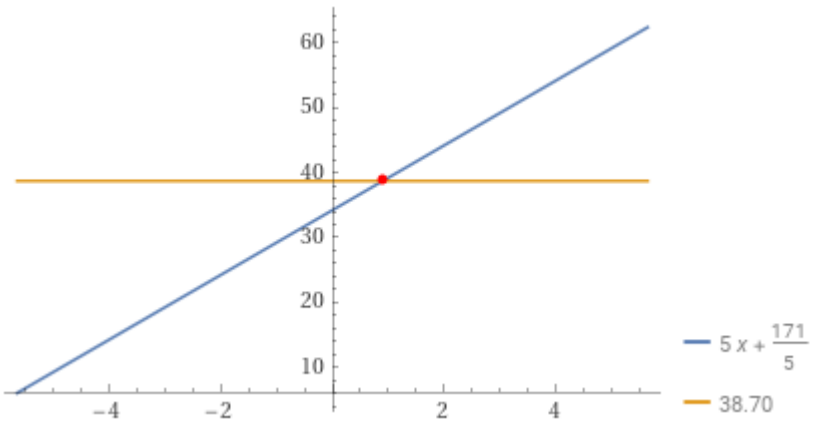
Result

$$\frac{1}{60}\left(\text{int}\left(60\,\text{frac}\left(\frac{1}{60}(300x+2052)\right)\right)+\text{frac}\left(60\,\text{frac}\left(\frac{1}{60}(300x+2052)\right)\right)+60\,\text{int}\left(\frac{1}{60}(300x+2052)\right)\right)=38.70$$

frac(x) is the fractional part function

int(x) is the integer part function

Plot



Alternate form assuming x is real

$$5.00\,x=4.50$$

Alternate forms

$$5x + \frac{171}{5} = 38.70$$

$$1.000\,\text{int}\left(60\,\text{frac}\left(\frac{1}{5}(25x + 171)\right)\right) + 1.000\,\text{frac}\left(60\,\text{frac}\left(\frac{1}{5}(25x + 171)\right)\right) + 60.00\,\text{int}\left(\frac{1}{5}(25x + 171)\right) = 2322.$$

Expanded forms

$$\frac{1}{60}\,\text{int}\left(60\,\text{frac}\left(\frac{1}{60}(300x + 2052)\right)\right) + \frac{1}{60}\,\text{frac}\left(60\,\text{frac}\left(\frac{1}{60}(300x + 2052)\right)\right) + \text{int}\left(\frac{1}{60}(300x + 2052)\right) = 38.70$$

$$\frac{1}{60}\,\text{int}\left(60\,\text{frac}\left(5x + \frac{171}{5}\right)\right) + \frac{1}{60}\,\text{frac}\left(60\,\text{frac}\left(5x + \frac{171}{5}\right)\right) + \text{int}\left(5x + \frac{171}{5}\right) = 38.70$$

Solution

$x \approx 0.9000$

0.9000

From which:

1/3*(2/0.9000)^2

Input

$$\frac{1}{3}\left(\frac{2}{0.9}\right)^2$$

Result

1.646090534979423868312757201646090534979423868312757201646090534 9

…

1.6460905349…. ≈ $\zeta(2) = \pi^2/6 = 1.644934$ (trace of the instanton shape and Ramanujan Recurring Number)

(1/3*(2/0.9000)^2)^15-34-2-1/π

Input

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi}$$

Result

1728.93…

1728.93….

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve $1728 = 8^2 \times 3^3$. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways $10^3 + 9^3 = 12^3 + 1^3 = 1729$ and Ramanujan's recurring number). Since bosons are made of gauge bosons and scalar bosons (meson), then this number theoretic analysis perhaps confirms that the number 1729, confirm the fact that both the gauge and scalar bosons are actually different states of a single bosonic string, and that these states are isomorphic or that the states vibrations are synchronised with the state of the bosonic string. This also imply that each state lives inside a cubic or octahedron as a spherical cloud, and that the total sum of these two states is the state of the bosonic string. Taking the cross section of the bosonic string, we realise that it must be a rectangular, or a two shaped octahedron. As the string vibrates in difference frequencies, so is the two spherical cloud states inside the string. That is, the string vibrations simply excites the gauge bosons i.e Photon, gluon, W and Z inside one cube/octahedron, and the scalar boson i.e. Higgs inside the other cube/octahedron.

Furthermore, if we bring the picture of loop quantum gravity (LQG) with the property of a discontinues quantum geometry, we can therefore, think of the graviton living on the vertices of the rectangles or the octahedrons. This graviton then acts a glue binding the bosonic strings lattice together forming a complete cross section of alternating states of between the gauge bosons and scalar bosons. This arrangement of states then gives a precise supersymmetric quantum picture of the vacuum geometry at low entropy.

But the geometry further reveals very important fact, that since the vacuum geometry is discontinues, then we observe that there is no relation whatsoever between the quantum vibrational frequencies of the strings, and that of the vertices of the vacuum geometry where the graviton lives. Ashtekar et al., (2021) asserted that gravity is simply a manifestation of spacetime geometry. Thus, the graviton cannot be a string boson, however, there is a duality between gravity and strings. Also, gauge bosons have spin-1, while the graviton has spin-2. Then lastly, because of the thermodynamic constraints we were able to arrive at the results we have, now this bring us to this fundamental question; that string theory and LQG theory are two intrinsic aspects of a complete quantum gravity theory we are after? That is, without the other no complete and compelling quantum geometry can be attained, as it is done here? This need to be investigated further.

Alternative representations

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = -36 - \frac{1}{180^\circ} + \left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = -36 - -\frac{1}{i\log(-1)} + \left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = -36 - \frac{1}{\cos^{-1}(-1)} + \left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15}$$

$\log(x)$ is the natural logarithm

i is the imaginary unit

$\cos^{-1}(x)$ is the inverse cosine function

Series representations

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = 1729.25 - \frac{1}{4\sum_{k=0}^{\infty} \frac{(-1)^k}{1+2k}}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = 1729.25 + \frac{1}{2 - 2\sum_{k=1}^{\infty} \frac{2^k}{\binom{2k}{k}}}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = 1729.25 - \frac{1}{\sum_{k=0}^{\infty} \frac{2^{-k}\,(-6+50k)}{\binom{3k}{k}}}$$

$\binom{n}{m}$ is the binomial coefficient

Integral representations

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = 1729.25 - \frac{1}{2\int_0^{\infty} \frac{1}{1+t^2}\,dt}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = 1729.25 - \frac{1}{4\int_0^1 \sqrt{1-t^2}\,dt}$$

$$\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15} - 34 - 2 - \frac{1}{\pi} = 1729.25 - \frac{1}{2\int_0^{\infty} \frac{\sin(t)}{t}\,dt}$$

(1/27(((1/3*(2/0.9000)^2)^15)-1))^2-144-29-Φ

Input

$$\left(\frac{1}{27}\left(\left(\frac{1}{3}\left(\frac{2}{0.9}\right)^2\right)^{15}-1\right)\right)^2-144-29-\Phi$$

Φ is the golden ratio conjugate

Result

4096.03…

4096.03…. ≈ 4096

The number 4096 = 64^2, is the Ramanujan Recurring Number, that when multiplied by 2 give 8192. The total amplitude vanishes for gauge group SO(8192) for bosonic string SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). This could be the implications for a pre-big bang scenario where only self-perturbative bosonic strings lived when the enthalpy was extremely low as discussed above. This regime contains all the intrinsic properties of superstrings inherent in the bosonic strings, would at the big bang give effect to the properties of matter (fermions) as Higgs Boson. This number theoretic connection to the gauge group SO(8192), gives a much more compelling relevance of the bosonic string theory SO(8192), to quantum gravity and places this string theory where it should appropriately be in the evolution of the universe from a quantum gravity perspective rather than it be neglected because it doesn't include fermionic strings to confirm to post big-bang reality. The vanishing of the bosonic string's amplitude could be explained by the effect of extreme low entropy on the quantum vacuum geometry. Thus, as the entropy increases infinitesimally as a result of the vacuum self-perturbation then also is the amplitude of the vibrating bosonic strings from zero. Thus, was right to indicate that the "vanishing of the amplitude of the bosonic string could be the results of string theory itself", but here, we give a much more elaborate explanation of what could be happening.

On the application of the formulas of the volumes of an octahedron and a sphere

With regard to a sphere inscribed in an octahedron, we have the following formulas.

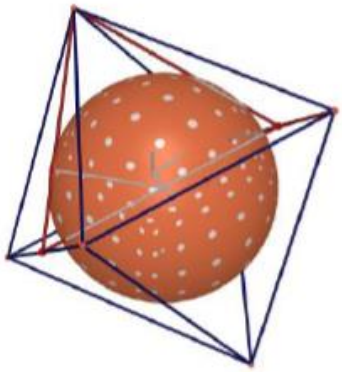


Fig: sphere inscribed in an octahedron

$V_0 = \frac{1}{3}\sqrt{2}\,l^3$

$V_s = \frac{4}{3}\pi r^3$; where $r_s = (l/2)$

With regard the ratio between the two above formulas (octahedron and sphere)

(1/3*√2*l^3)/(4/3*π*(l/2)^3)

we obtain:

Input

$$\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Result

$\frac{\sqrt{2}\ 2}{\pi}$ (for $l \neq 0$)

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

Series representations

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\sqrt{z_0}\ \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\ \sum_{k=0}^{\infty} \frac{(-1)^k (2-x)^k\, x^{-k} \left(-\frac{1}{2}\right)_k}{k!}}{\pi}$$

for $(x \in \mathbb{R} \text{ and } x < 0)$

$$\frac{\sqrt{2}\ l^3}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = \frac{2\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k (2-z_0)^k\, z_0^{-k}}{k!}}{\pi}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From which:

1/3*(2/((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^2

Input

$$\frac{1}{3}\left(\frac{2}{\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}}\right)^2$$

Result

$$\frac{\pi^2}{6}$$

Decimal approximation

1.64493406684822643647241516664602518921894990120679843773555822 93

…

1.644934066848226… = ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Property

$\frac{\pi^2}{6}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \sum_{k=1}^{\infty}\frac{1}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = -2\sum_{k=1}^{\infty}\frac{(-1)^k}{k^2}$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{4}{3}\sum_{k=0}^{\infty}\frac{1}{(1+2k)^2}$$

Integral representations

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{8}{3}\left(\int_0^1\sqrt{1-t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^\infty \frac{1}{1+t^2}\,dt\right)^2$$

$$\frac{1}{3}\left(\frac{2}{\frac{\sqrt{2}\,l^3}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}}\right)^2 = \frac{2}{3}\left(\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt\right)^2$$

We note that, from the sum of the first nine numbers excluding 0, i.e., 1+2+3+4+5+6+7+8+9 = 45 (these are the fundamental numbers, from which, through infinite combinations, all the other numbers are obtained), we obtain the following interesting formula:

1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)

Input

$$1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1$$

Decimal approximation

1.64529737852077603277189622979372820045495342111029157082539392 86

…

1.64529737852…. ≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

Alternate forms

$$3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{2\pi C_{\text{MRB}} + 3\phi^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{2}\left(3+\sqrt{5}\right)}} + 1$$

$$2^{2/3} \times 3^{1/3-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{8\pi C_{\text{MRB}} + 18 + 6\sqrt{5}}} + 1$$

Expanded forms

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{1}{4}\left(1+\sqrt{5}\right)^2}} + 1$$

$$3^{-2/(3\pi)} \times 5^{-1/(3\pi)} \sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3} + \frac{3}{2} + \frac{\sqrt{5}}{2}}} + 1$$

And:

sqrt(6(1+1/(((φ^2+(2Pi)/3*MRB const)(1/e((1+2+3+4+5+6+7+8+9)^(1/Pi))))^1/3)))

Input

$$\sqrt{6\left(1+\frac{1}{\sqrt[3]{\left(\phi^2+\frac{2\pi}{3}C_{\text{MRB}}\right)\left(\frac{1}{e}\sqrt[\pi]{1+2+3+4+5+6+7+8+9}\right)}}\right)}$$

ϕ is the golden ratio

C_{MRB} is the MRB constant

Exact result

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{\text{MRB}}}{3}+\phi^2}}+1\right)}$$

Decimal approximation

3.141939571526584308924330732196162632677513386811659044682541739 3

…

3.141939571526…. ≈ π (Ramanujan Recurring Number)

Alternate forms

$$\sqrt{6\left(3^{1/3-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{2\pi C_{\text{MRB}}+3\phi^2}}+1\right)}$$

$$3^{1/2-1/(3\pi)}\times 5^{-1/(6\pi)}\sqrt{2\left(\sqrt[3]{\frac{6e}{4\pi C_{\text{MRB}}+9+3\sqrt{5}}}+3^{2/(3\pi)}\sqrt[3\pi]{5}\right)}$$

Expanded forms

$$\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{1}{4}\left(1+\sqrt{5}\right)^2}}+1\right)}$$

$$\sqrt{2\times 3^{1-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\frac{3}{2}+\frac{\sqrt{5}}{2}}}+6}$$

All 2nd roots of 6 ($3^{-2/(3\pi)}\,5^{-1/(3\pi)}\,(e/((2\pi C_{MRB})/3+\phi^2))^{1/3}+1$)

$$e^0\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx 3.1419 \text{ (real, principal root)}$$

$$e^{i\pi}\sqrt{6\left(3^{-2/(3\pi)}\times 5^{-1/(3\pi)}\sqrt[3]{\frac{e}{\frac{2\pi C_{MRB}}{3}+\phi^2}}+1\right)}\approx -3.1419 \text{ (real root)}$$

Furthermore, we obtain also:

2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3))

Input

$$2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

8

8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

Series representations

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 4\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$4\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{\,1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

$6\pi*\sqrt{2}((1/3*\sqrt{2}*l^3)/(4/3*\pi*(l/2)^3))$

Input

$$6\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}$$

Exact result

24

24

The value 24 is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string representing a bosons. From the analysis, we observe that the is no number theoretic connection with physical vibrations of fermionic strings at extremally low entropy. This fact is confirmed by the fact that the Higgs bosons at the moment of the big bang and infinitesimally shortly thereafter, facilitated the creation of fermions (matter and antimatter particles) [8]. Thus we note that the ingredients for the formation of electromagnetic radiation from photons (a Boson), and the formation of matter from the Higgs boson after the big bang, are intrinsic properties of the vacuum energy in pre-big bang.

Series representations

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}=12\sqrt{z_0}^2\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2$$

for $(\text{not}\,(z_0\in\mathbb{R}\ \text{and}\ -\infty<z_0\le 0))$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} = 12\exp^2\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{(6\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3} =$$

$$12\left(\frac{1}{z_0}\right)^{\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1+\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^2$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

This could imply that all matter (fermions) was preceded by bosons. That is, before the Big Bang, from perturbations of the vacuum energy itself, bosons were created, and successively at the Big Bang, and infinitesimally shortly after the Big Bang, fermions, were created from the vacuum energy that underwent a violent “breaking” that formed a hot plasma. of particle-antiparticle pairs. This therefore implies that quantum gravity was not necessarily “dark” to some extent, because a photon (light particle) is itself a boson. Therefore, a big bang was not necessarily the moment of the creation of light, but of the creation of matter (fermions) from vacuum energy, as this undergoes further "breaking" in the cosmological constant, in the hot plasma of matter and in the energy dark.

(2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4

Input

$$\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4$$

Exact result

4096

4096 = 64^2 , (Ramanujan Recurring Number) that multiplied by 2 give 8192, indeed:

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group. The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). (From: "Dilaton Tadpole for the Open Bosonic String " Michael R. Douglas and Benjamin Grinstein - September 2,1986)

27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1

Input

$$27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4}+1$$

Exact result

1729

1729

This result is very near to the mass of candidate glueball $f_0(1710)$ scalar meson. Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve ($1728 = 8^2 * 3^3$).

The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number, as it can be expressed as the sum of two cubes in two different ways ($10^3 + 9^3 = 12^3 + 1^3 = 1729$) and Ramanujan's recurring number)

Series representations

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(-1+256\sqrt{2}^8\right)^{-k}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=$$
$$1+27\sqrt{-1+256\sqrt{2}^8}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(-1+256\sqrt{2}^8\right)^{-k}}{k!}$$

$$27\sqrt{\left(\frac{(2\pi\sqrt{2})(\sqrt{2}\,l^3)}{\frac{1}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)3}\right)^4}+1=1+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

$\binom{n}{m}$ is the binomial coefficient

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

We note that:

1/25*1/144(((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+(27*sqrt((2π*√2((1/3*√2*l^3)/(4/3*π*(l/2)^3)))^4)+1))

Input

$$\frac{1}{25}\times\frac{1}{144}\left(\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+\left(27\sqrt{\left(2\pi\sqrt{2}\times\frac{\frac{1}{3}\sqrt{2}\,l^3}{\frac{4}{3}\pi\left(\frac{l}{2}\right)^3}\right)^4+1}\right)\right)$$

Exact result

$$\frac{233}{144}$$

Decimal approximation

1.6180555555555555555555555555555555555555555555555555555555555555555555555555

…

1.61805555…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Repeating decimal

$1.6180\overline{5}$ (period 1)

Series representations

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\sqrt{z_0}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=$$
$$\frac{1}{3600}\left(1+256\exp^8\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^8\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^8+27\exp\left(i\pi\left\lfloor\frac{\arg\left(-x+256\sqrt{2}^8\right)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k x^{-k}\left(-\frac{1}{2}\right)_k\left(-x+256\sqrt{2}^8\right)^k}{k!}\right)\quad\text{for } (x\in\mathbb{R} \text{ and } x<0)$$

$$\frac{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+\left(27\sqrt{\left(\frac{2\left(\sqrt{2}\ l^3\right)\pi\sqrt{2}}{\frac{3}{3}\left(4\pi\left(\frac{l}{2}\right)^3\right)}\right)^4+1}\right)}{144\times 25}=\frac{1}{3600}$$
$$\left(1+256\left(\frac{1}{z_0}\right)^{4\lfloor\arg(2-z_0)/(2\pi)\rfloor}z_0^{4+4\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^8+27\left(\frac{1}{z_0}\right)^{1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}z_0^{1/2+1/2\left\lfloor\arg\left(256\sqrt{2}^8-z_0\right)/(2\pi)\right\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(256\sqrt{2}^8-z_0\right)^k z_0^{-k}}{k!}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

we obtain also:

sqrt(6(1/3*(2/(((2sqrt2)/Pi)))^2))

Input

$$\sqrt{6\left(\frac{1}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2\right)}$$

Exact result

π

Decimal approximation

3.14159265358979323846264338327950288419716939937510582097494459 23

…

3.14159265358… = π

Property

π is a transcendental number

All 2nd roots of π^2

$\pi e^{0} \approx 3.1416$ (real, principal root)

$\pi e^{i\pi} \approx -3.1416$ (real root)

Series representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\sum_{k=0}^{\infty}\frac{(-1)^k}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty} -\frac{4\,(-1)^k\,1195^{-1-2k}\left(5^{1+2k}-4\times 239^{1+2k}\right)}{1+2k}$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = \sum_{k=0}^{\infty}\left(-\frac{1}{4}\right)^k\left(\frac{1}{1+2k}+\frac{2}{1+4k}+\frac{1}{3+4k}\right)$$

Integral representations

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 4\int_0^1 \sqrt{1-t^2}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^1 \frac{1}{\sqrt{1-t^2}}\,dt$$

$$\sqrt{\frac{6}{3}\left(\frac{2}{\frac{2\sqrt{2}}{\pi}}\right)^2} = 2\int_0^\infty \frac{1}{1+t^2}\,dt$$

It is plausible to hypothesize that π and φ, in addition to being important mathematical constants, are constants that also have a fundamental relevance in the various sectors of Theoretical Physics and Cosmology

From $\frac{\pi^2}{6}$, we obtain:

sqrt(1/(Pi^2/6)*(4/3))

Input

$$\sqrt{\frac{1}{\frac{\pi^2}{6}} \times \frac{4}{3}}$$

Exact result

$$\frac{2\sqrt{2}}{\pi}$$

Decimal approximation

0.900316316157106069555199191006740582664574149955220625571437471 2

…

0.900316316157106…. = $\frac{2\sqrt{2}}{\pi}$ (DN Constant)

Property

$\frac{2\sqrt{2}}{\pi}$ is a transcendental number

All 2nd roots of $8/\pi^2$

$\frac{2\sqrt{2}\ e^0}{\pi} \approx 0.9003$ (real, principal root)

$\frac{2\sqrt{2}\ e^{i\pi}}{\pi} \approx -0.9003$ (real root)

Series representations

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-1+\frac{8}{\pi^2}\right)^k \left(-\frac{1}{2}\right)_k}{k!}$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(\frac{8}{\pi^2}-z_0\right)^k z_0^{-k}}{k!} \quad \text{for } (\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$$

$$\sqrt{\frac{4}{\frac{3\pi^2}{6}}} = \exp\left(i\,\pi\left\lfloor\frac{\arg\left(\frac{8}{\pi^2}-x\right)}{2\,\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k\left(\frac{8}{\pi^2}-x\right)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

DN Constant extended

We have the following expression concerning the ratios (and/or the inverses) between the icosahedron, octahedron and tetrahedron volumes and the sphere volume.

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

(we have highlighted the DN Constant in blue)

(((((5/12*(3+√5)*d^3)/(4/3*π*(d/2)^3))*1/((1/3*√2*a^3)/(4/3*π*(a/2)^3)) *1/((((√2 d^3)/12))*1/(4/3*π*(d/2)^3)))))^(1/(2π))

Input

$$\sqrt[2\pi]{\frac{\frac{5}{12}\left(3+\sqrt{5}\right)d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}\,a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\left(\frac{1}{12}\left(\sqrt{2}\,d^3\right)\right)\times\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}$$

Exact result

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

Decimal approximation

1.618008545900107058100262397953600521294343596022695608492128897 1

…

1.6180085459…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

Alternate form

$$2^{-1/\pi}\sqrt[2\pi]{\left(15+5\sqrt{5}\right)\pi}$$

Series representations

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^3}}}=\sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)}{\sqrt{z_0}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2}}$$

for $\left(\text{not}\left(z_0\in\mathbb{R}\text{ and }-\infty<z_0\le 0\right)\right)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} = \sqrt[2\pi]{\frac{5}{2}}\sqrt[2\pi]{\frac{\pi\left(3+\exp\left(i\,\pi\left\lfloor\frac{\arg(5-x)}{2\pi}\right\rfloor\right)\sqrt{x}\;\sum_{k=0}^{\infty}\frac{(-1)^k(5-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)}{\exp^2\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,2}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k\,x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^2}}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\sqrt[2\pi]{\frac{5\left(3+\sqrt{5}\right)d^3}{\frac{\left(\left(\sqrt{2}\,a^3\right)\left(\sqrt{2}\,d^3\right)\right)12\left(4\pi\left(\frac{d}{2}\right)^3\right)}{\left(\left(3\left(4\pi\left(\frac{a}{2}\right)^3\right)\right)\left(12\left(4\pi\left(\frac{d}{2}\right)^3\right)\right)\right)^{3\times 3}}}} = \sqrt[2\pi]{\frac{5}{2}}\left(\left(\pi\left(\frac{1}{z_0}\right)^{-\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{-1-\lfloor\arg(2-z_0)/(2\pi)\rfloor}\left(3+\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor} z_0^{1/2+1/2\lfloor\arg(5-z_0)/(2\pi)\rfloor}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k\,z_0^{-k}}{k!}\right)^2\right)^{\wedge}\left(\frac{1}{2\pi}\right)$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

Integral representation

$$(1+z)^a = \frac{\int_{-i\infty+\gamma}^{i\infty+\gamma} \frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0 < \gamma < -\mathrm{Re}(a) \text{ and } |\arg(z)| < \pi)$$

$\Gamma(x)$ is the gamma function

$\mathrm{Re}(z)$ is the real part of z

$|z|$ is the absolute value of z

Furthermore, from the formula

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

we obtain also:

(4 (1.6180085459)^(2 π))/(5 (3 + sqrt(5))) = 3.1415926535

Indeed:

$$\frac{4\times 1.6180085459^{2\pi}}{5\left(3+\sqrt{5}\right)}$$

3.14159265358848716242219325098587152789310251892455761700781006 13
…

3.1415926535…. = π (Ramanujan Recurring Number)

From the following extended DN Constant (“Unitary Formula”)

$$\sqrt[2\pi]{\frac{\frac{5}{12}(3+\sqrt{5})d^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}\times\frac{1}{\frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi\left(\frac{a}{2}\right)^3}}\times\frac{1}{\frac{\sqrt{2}}{12}d^3\cdot\frac{1}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3}}}\times\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

with regard

$$\sqrt[3]{-\frac{q}{2}+\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}+\sqrt[3]{-\frac{q}{2}-\sqrt{\frac{q^2}{4}+\frac{p^3}{27}}}$$

for q = 1729 and p = 4096, we obtain by changing the sign in the algebraic sum of the aforementioned Cardano’s Formula and after some calculations:

$$2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}$$

multiplied by

$$\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}$$

and performing the ninth root of the entire expression:

√((2^(-1/π)(5(3+√(5))π)^(1/(2π)))((∛(-1729/2+√(1729^2/4+4096^3/27)) -∛(-1729/2-√(1729^2/4+4096^3/27)))^1/9))

we obtain:

$$\sqrt{\left(\left(2^{-1/\pi}\sqrt[2\pi]{5\left(3+\sqrt{5}\right)\pi}\right)\sqrt[9]{\sqrt[3]{-\frac{1729}{2}+\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}-\sqrt[3]{-\frac{1729}{2}-\sqrt{\frac{1729^2}{4}+\frac{4096^3}{27}}}}\right)}$$

$$2^{-1/(2\pi)}\sqrt[18]{\sqrt[3]{\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}-\frac{1729}{2}}+\sqrt[3]{\frac{1729}{2}+\frac{\sqrt{\frac{274\,958\,621\,851}{3}}}{6}}}\Big/\sqrt[4\pi]{5\left(3+\sqrt{5}\right)\pi}$$

i.e.

2^(-1/(2π)) ((-1729/2+√(274958621851/3)/6)^(1/3)+(1729/2 + √(274958621851/3)/6)^(1/3))^(1/18) (5(3+√(5)) π)^(1/(4π))

= 1.61549140391….

The general "unitary" formula, which derives from DN Constant, is the following:

$$\sqrt{2\times\frac{2\cdot\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\cdot 0.9991104684}(C\times \mathrm{R}\times 2.33\cdot 10^{-13})}}\cong 1.61803398\ldots=\frac{\sqrt{5}+1}{2}$$

Where $\frac{2\sqrt{2}}{\pi}$ is the Del Gaudio-Nardelli Constant, 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

C is any constant or solution to an equation, R is the radius of the Universe and $2.33*10^{-13}$ is the temperature of the universe expressed in GeV.

For example, $C = 9.9128$, inserting a radius of the Universe, which we have calculated, equal to $R = 2.06274*10^{12}$ years, from DN Constant "unitary" formula, we obtain:

√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}$$

1.618035912348264235440174408834709854254527350840173356306481810 7

…

1.618035912348…. result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We obtain also:

(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))dxdydz

Indefinite integral assuming all variables are real

$$0.809018\, x^2\, y\, z + \text{constant}$$

Definite integral over a cube of edge length 2 L

$$\int_{-L}^{L}\int_{-L}^{L}\int_{-L}^{L} 1.61804\, dx\, dy\, dz = 12.9443\, L^3$$

Definite integral over a sphere of radius R

$$\iiint_{x^2+y^2+z^2<R^2} 1.61804\, dz\, dy\, dx = 6.77761\, R^3$$

From which, for L = R = 1 , dividing the two definite integral results by the original expression, we obtain:

12.9443/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13)))))

Input interpretation

$$\frac{12.9443}{\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

8.00001…

8.00001…. ≈ 8

value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 8 "modes" corresponding to the physical vibrations of a superstring.

And

3*(6.77761/(√(2×(2·(((2√2)/π))^(1/16))/(1/(π·0.9991104684) (9.9128×(2.06274 × 10^12)×2.33·10^(-13))))))

Input interpretation

$$3\times\frac{6.77761}{\sqrt{2\times\frac{2^{16}\sqrt{\frac{2\sqrt{2}}{\pi}}}{\frac{1}{\pi\times 0.9991104684}\times\frac{9.9128\times 2.06274\times 10^{12}\times 2.33}{10^{13}}}}}$$

Result

12.5664…

12.5664…. ≈ 4π = Bekenstein-Hawking (S_{BH}) black hole entropy

New fundamental formula deriving from DN Constant

The DN Constant (Del Gaudio-Nardelli Constant) equals (2√2)/π) is defined as the ratio of the volume of an octahedron to the volume of a sphere and is an intriguing mathematical concept. Michele Nardelli hypothesized that the regular octahedron represents a phase in which the universe is highly symmetrical and with very low entropy. On the other hand, the sphere (which is inscribed in the octahedron, i.e. is "inside" it) represents the universe emerging from the quantum vacuum, which over

time increases entropy and undergoes various symmetry breakings. This occurs in a regime of eternal inflation.

From the following expression

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×C×R)))

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\,C\,R\right)}}$$

which comes from the DN Constant, with $1.616255*10^{-35}$ which is equal to the Planck length, $1.1056*10^{-52}$ which is equal to the Cosmological Constant, C = 1729 which corresponds to the Hardy-Ramanujan number and $R = 4.6018401361 \times 10^{-24}$, which represents the radius of the Universe, we obtain:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×4.6018401361 × 10^-24))) = 1.6180329973...

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times 10^{-35}}{1.1056\times 10^{-52}}\times 1729\times 4.6018401361\times 10^{-24}\right)}}$$

1.6180329973075324915067570166297467464225772608929671407919395903
…

1.6180329973075… result that is a very good approximation to the value of the golden ratio 1.618033988749… (Ramanujan Recurring Number)

We have also the following formula:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(4.4525642121 × 10^-24))))

Input interpretation

$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times10^{-35}}{1.1056\times10^{-52}}\times 1729\times 4.4525642121\times10^{-24}\right)}}$$

Result

1.64493235210209213048389898370415116887662184165516687791416603 38…

1.64493235210209213…≈ ζ(2) = $\pi^2/6$ = 1.644934 (trace of the instanton shape and Ramanujan Recurring Number)

And again:

√(2×(2·(((2√2)/π)^(1/16)))/(4096/(π·0.9991104684) (((1.616255*10^-35)/(1.1056*10^-52))×1729×(1.2206935225 × 10^-24))))

Input interpretation

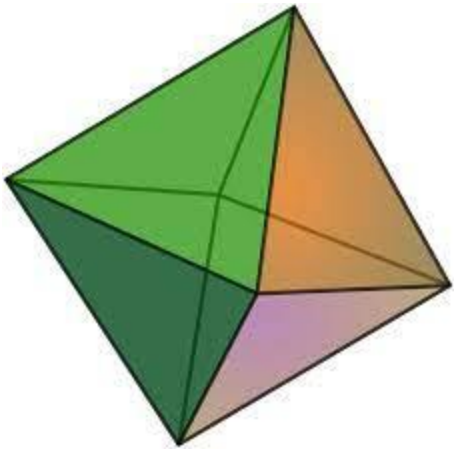
$$\sqrt{2\times\frac{2\sqrt[16]{\frac{2\sqrt{2}}{\pi}}}{\frac{4096}{\pi\times 0.9991104684}\left(\frac{1.616255\times10^{-35}}{1.1056\times10^{-52}}\times 1729\times 1.2206935225\times10^{-24}\right)}}$$

Result

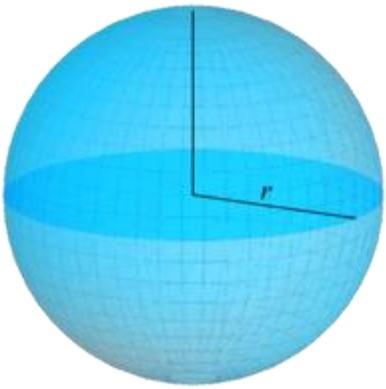
3.14159225731469939939950039231605796469731171781644423955790024797 …

3.14159225731469…. ≈ π (Ramanujan Recurring Number)

Now, we have that:



Octahedron



Sphere

Given the value of a volume, independently of the solid, following the Poincaré Conjecture, we compare any solid "without holes" and a sphere. If we compare an octahedron with a sphere, we have:

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

If we consider the radius of the sphere as an unknown, we must find the value of the side of the octahedron which allows us to equalize the two volumes and which will give us the DN Constant as a result (which will therefore be equal to the radius of the sphere).

From

$$\frac{4}{3}\pi r^3 = \frac{1}{3}\sqrt{2}a^3$$

To find r we perform the following calculation:

$$r^3 = \frac{\frac{1}{3}\sqrt{2}a^3}{\frac{4}{3}\pi} = \frac{1}{3}\sqrt{2}a^3 \cdot \frac{3}{4\pi} = \frac{\sqrt{2}a^3}{4\pi} = \frac{\sqrt{2}\cdot\sqrt{2}a^3}{\sqrt{2}\cdot 4\pi} = \frac{2a^3}{\sqrt{2}\cdot 4\pi} = \frac{a^3}{2\sqrt{2}\pi}$$

$$r^3 = \frac{a^3}{2\sqrt{2}\pi}; \qquad r = \sqrt[3]{\frac{a^3}{2\sqrt{2}\pi}} = \frac{a}{\sqrt[3]{2\sqrt{2}\pi}}$$

To find a, we have, for

$$r = \frac{2\sqrt{2}}{\pi}; \qquad \frac{a}{\sqrt[3]{2\sqrt{2}\pi}} = \frac{2\sqrt{2}}{\pi};$$

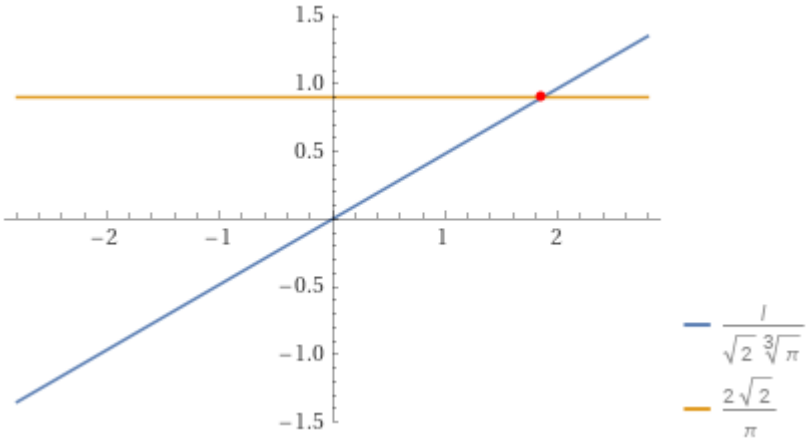
Thus, multiplying both the sides by $\sqrt[3]{2\sqrt{2}\pi}$, we obtain:

$$a = \frac{2\sqrt{2}}{\pi} \cdot \sqrt[3]{2\sqrt{2}\pi} = \sqrt[3]{\frac{(2\sqrt{2})^3 2\sqrt{2}\pi}{\pi^3}} =$$

$$= \sqrt[3]{\frac{8\cdot\sqrt{2^3}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{8\cdot\sqrt{2\cdot 2^2}\cdot 2\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{16\cdot\sqrt{2}\cdot 2\sqrt{2}}{\pi^2}}$$

$$= \sqrt[3]{\frac{32\sqrt{2}\sqrt{2}}{\pi^2}} = \sqrt[3]{\frac{32\cdot 2}{\pi^2}} = \frac{\sqrt[3]{64}}{\sqrt[3]{\pi^2}} = \frac{4}{\sqrt[3]{\pi^2}}; \; a = \frac{4}{\sqrt[3]{\pi^2}}$$

Plot



Solution

$a = \frac{4}{\sqrt[3]{\pi^2}}$

for V = 1/3*√2*a^3 (octahedron volume) and V = (4/3*π*r^3) (sphere volume), we obtain:

from the octahedron volume, we have: V = 1/3*√2*a^3 = (1/3*√2*($\frac{4}{\sqrt[3]{\pi^2}}$)^3)

(1/3*√2*(4/∛(π^2))^3)

Input

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3$$

$\sqrt[3]{x}$ is the real-valued 3rd root of x

Exact result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\exp\left(i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}}{3\pi^2}$$

for ($x \in \mathbb{R}$ and $x < 0$)

$$\frac{1}{3}\sqrt{2}\left(\frac{4}{\sqrt[3]{\pi^2}}\right)^3 = \frac{64\left(\frac{1}{z_0}\right)^{1/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{1/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

And, from the sphere volume V = (4/3*π*r^3) = (4/3*π*((2√2)/π)^3)

(4/3*π*((2√2)/π)^3)

Input

$$\frac{4}{3}\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3$$

Result

$$\frac{64\sqrt{2}}{3\pi^2}$$

Decimal approximation

3.056848897337366735284768744174643472880661991020386025343029413 7

…

3.05684889733….

Property

$\frac{64\sqrt{2}}{3\pi^2}$ is a transcendental number

Series representations

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\sqrt{z_0}^3\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\exp^3\left(i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor\right)\sqrt{x}^{\,3}\left(\sum_{k=0}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^3}{3\pi^2}$$

for $(x \in \mathbb{R}$ and $x < 0)$

$$\frac{1}{3}\left(\pi\left(\frac{2\sqrt{2}}{\pi}\right)^3\right)4 = \frac{32\left(\frac{1}{z_0}\right)^{3/2\lfloor\arg(2-z_0)/(2\pi)\rfloor} z_0^{3/2(1+\lfloor\arg(2-z_0)/(2\pi)\rfloor)}\left(\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(2-z_0)^k z_0^{-k}}{k!}\right)^3}{3\pi^2}$$

$n!$ is the factorial function

$(a)_n$ is the Pochhammer symbol (rising factorial)

$\mathbb{R}$ is the set of real numbers

$\arg(z)$ is the complex argument

$\lfloor x \rfloor$ is the floor function

i is the imaginary unit

From:

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

We note that, with regard 4372, we can to obtain the following results:

27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3

…

1729.0526944….

This result is very near to the mass of candidate glueball **$f_0(1710)$ scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. ($1728 = 8^2 * 3^3$) The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi - 54 + 54\sqrt{1093} - \frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256x^8 + 95\,744x^7 - 3\,248\,750\,080x^6 - 914\,210\,725\,504x^5 + 15\,498\,355\,554\,921\,184x^4 + 2\,911\,478\,392\,539\,914\,656x^3 - 32\,941\,144\,911\,224\,677\,091\,680x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5}-1} - \frac{27\sqrt{10-2\sqrt{5}}}{2\left(\sqrt{5}-1\right)}$$

Series representations

$$27\left(\sqrt{4372} - 2 - \frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1+\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4372}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for $(\text{not } (z_0\in\mathbb{R} \text{ and } -\infty<z_0\le 0))$

Or:

27((4096+276)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ

Input

$$27\left(\sqrt{4096+276}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi$$

ϕ is the golden ratio

Result

$$\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)$$

Decimal approximation

1729.052694417090562517063720863714876368418930653845785481544702 3…

1729.0526944…. as above

Alternate forms

$$\frac{1}{8}\left(-27\sqrt{5\left(10-2\sqrt{5}\right)}+58\sqrt{5}+432\sqrt{1093}-27\sqrt{2\left(5-\sqrt{5}\right)}-374\right)$$

$$\phi-54+54\sqrt{1093}+\frac{27}{4}\left(1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

$$\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}$$

Minimal polynomial

$$256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10 - 2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10 - 2\sqrt{5}\right)}$$

$$-\frac{107}{2} + \frac{\sqrt{5}}{2} + 54\sqrt{1093} + \frac{27}{\sqrt{5} - 1} - \frac{27\sqrt{10 - 2\sqrt{5}}}{2\left(\sqrt{5} - 1\right)}$$

Series representations

$$27\left(\sqrt{4096 + 276} - 2 - \frac{\sqrt{10 - 2\sqrt{5}} - 2}{\left(\sqrt{5} - 1\right)2}\right) + \phi = \left(162 - 108\sqrt{1093} - 2\phi - 108\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} + 2\phi\sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k} - 27\sqrt{9 - 2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9 - 2\sqrt{5}\right)^{-k}\right) \Big/ \left(2\left(-1 + \sqrt{4}\sum_{k=0}^{\infty} 4^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$27\left(\sqrt{4096+276}\ -2-\frac{\sqrt{10-2\sqrt{5}}\ -2}{\left(\sqrt{5}\ -1\right)2}\right)+\phi=$$
$$\left(162-108\sqrt{1093}\ -2\phi-108\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+\right.$$
$$108\sqrt{1093}\ \sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}\ -z_0\right)^k\,z_0^{-k}}{k!}\right)\Big/$$
$$\left(2\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k\,z_0^{-k}}{k!}\right)\right)$$
for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \le 0$))

From which:

(27((4372)^1/2-2-1/2(((√(10-2√5) -2))/((√5-1))))+φ)^1/15

Input

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{1}{2}\times\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\right)+\phi}$$

ϕ is the golden ratio

Exact result

$$\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

Decimal approximation

1.643818568584986279990230131703681005418575687350518480483418312 4

…

$1.64381856858\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

Alternate forms

$$\sqrt[15]{\phi-54+54\sqrt{1093}-\frac{27\left(\sqrt{10-2\sqrt{5}}-2\right)}{2\left(\sqrt{5}-1\right)}}$$

$$\frac{1}{\sqrt[15]{\frac{2\left(\sqrt{5}-1\right)}{166-108\sqrt{5}-108\sqrt{1093}+108\sqrt{5465}-27\sqrt{2\left(5-\sqrt{5}\right)}}}}$$

$$\sqrt[15]{\text{root of } 256\,x^8 + 95\,744\,x^7 - 3\,248\,750\,080\,x^6 - 914\,210\,725\,504\,x^5 + 15\,498\,355\,554\,921\,184\,x^4 + 2\,911\,478\,392\,539\,914\,656\,x^3 - 32\,941\,144\,911\,224\,677\,091\,680\,x^2 - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041 \text{ near } x = 1729.05}$$

Minimal polynomial

$$256\,x^{120} + 95\,744\,x^{105} - 3\,248\,750\,080\,x^{90} - 914\,210\,725\,504\,x^{75} + 15\,498\,355\,554\,921\,184\,x^{60} + 2\,911\,478\,392\,539\,914\,656\,x^{45} - 32\,941\,144\,911\,224\,677\,091\,680\,x^{30} - 3\,092\,528\,914\,069\,760\,354\,714\,456\,x^{15} + 26\,320\,050\,609\,744\,039\,027\,169\,013\,041$$

Expanded forms

$$\sqrt[15]{\frac{1}{2}\left(1+\sqrt{5}\right) + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}$$

$$\sqrt[15]{-\frac{187}{4} + \frac{29\sqrt{5}}{4} + 54\sqrt{1093} - \frac{27}{8}\sqrt{10-2\sqrt{5}} - \frac{27}{8}\sqrt{5\left(10-2\sqrt{5}\right)}}$$

All 15th roots of ϕ + 27 (-2 + 2 sqrt(1093) - (sqrt(10 - 2 sqrt(5)) - 2)/(2 (sqrt(5) - 1)))

$$e^0\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.64382 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\phi + 27\left(-2 + 2\sqrt{1093} - \frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)} \approx 1.50170 + 0.6686\,i$$

$$e^{(4\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 1.0999+1.2216\,i$$

$$e^{(2\,i\,\pi)/5}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx 0.5080+1.5634\,i$$

$$e^{(8\,i\,\pi)/15}\sqrt[15]{\phi+27\left(-2+2\sqrt{1093}-\frac{\sqrt{10-2\sqrt{5}}-2}{2\left(\sqrt{5}-1\right)}\right)}\approx -0.17183+1.63481\,i$$

Series representations

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+108\sqrt{1093}\sqrt{4}\right.\right.\right.$$
$$\left.\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}+2\phi\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}-27\sqrt{9-2\sqrt{5}}\right.$$
$$\left.\left.\left.\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}\right)\Big/\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)\right)\right)\wedge(1/15)\Bigg)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}+2\phi\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}-$$
$$\left.27\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{4}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\wedge(1/15)\right)$$

$$\sqrt[15]{27\left(\sqrt{4372}-2-\frac{\sqrt{10-2\sqrt{5}}-2}{\left(\sqrt{5}-1\right)2}\right)+\phi}=$$
$$\frac{1}{\sqrt[15]{2}}\left(\left(\left(162-108\sqrt{1093}-2\phi-108\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+\right.\right.\right.$$
$$108\sqrt{1093}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}+$$
$$2\phi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}-$$
$$\left.27\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/$$
$$\left.\left.\left(-1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(5-z_0)^k z_0^{-k}}{k!}\right)\right)\wedge(1/15)\right)$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

Integral representation

$$(1+z)^a=\frac{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(s)\,\Gamma(-a-s)}{z^s}\,ds}{(2\pi i)\,\Gamma(-a)} \quad \text{for } (0<\gamma<-\mathrm{Re}(a) \text{ and } |\arg(z)|<\pi)$$

From:

An Update on Brane Supersymmetry Breaking - *J. Mourad and A. Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E \phi} = -\frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

$$16\, k'\, e^{-2C} = \frac{h^2 \left(p + 1 - \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}}{(7-p)}$$

$$(A')^2 = k\, e^{-2A} + \frac{h^2}{16(p+1)} \left(7 - p + \frac{2\beta_E^{(p)}}{\gamma_E}\right) e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-2(8-p)C + 2\beta_E^{(p)}\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning *p*, *C*, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and β_E = 1/2:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 64^2, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi\sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.627201622607250929294215673911797954183858113695401 6\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\,\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10^{-6}$$

$$0.000244140625\ e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10^{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141} = 4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}\,17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

–5.010882647757...

-5.010882647757…

Alternative representations:

$\log(0.006665017846190000) = \log_e(0.006665017846190000)$

$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$

$\log(0.006665017846190000) = -\mathrm{Li}_1(0.993334982153810000)$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k\,(-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2\,i\,\pi\left\lfloor \frac{\arg(0.006665017846190000 - x)}{2\,\pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k\,(0.006665017846190000 - x)^k\,x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k \, (0.006665017846190000 - z_0)^k \, z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$$\phi = -5.010882647757 + 6 = 0.989117352243 = \boldsymbol{\phi}$$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}} - \varphi + 1} = 1 - \cfrac{e^{-\pi}}{1 + \cfrac{e^{-2\pi}}{1 + \cfrac{e^{-3\pi}}{1 + \cfrac{e^{-4\pi}}{1 + \ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value 0.989117352243 = $\boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:

Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\,. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\,,$$

$$a \;=\; \frac{b\gamma}{e} \;<\; 0\,, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5}\sqrt[4]{5^3}}-1}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+...}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V=\frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V=\frac{1}{3}(0.0814845\,b+1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives

$$\frac{\partial b(M,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M,V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b,V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b,V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b,M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b,M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1 - \frac{(b\,2)\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684 - \frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\,\sqrt{6}}\right)^2\right\} = 0$$

$$\text{for } b = -\frac{226\,802\,245}{18\,480\,874}$$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

for $M=0$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain:

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

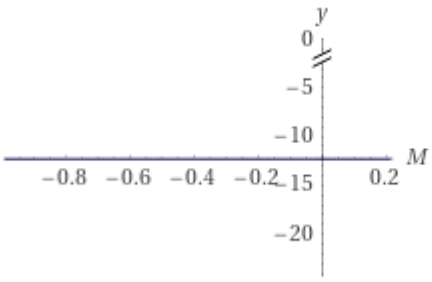
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

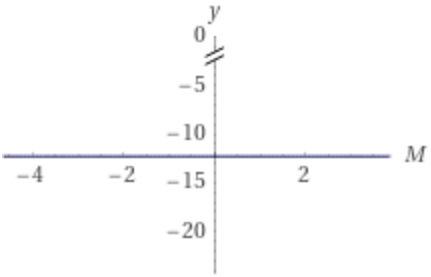
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(*M* from −1 to 0.2)



(*M* from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2-1.21228\times10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times10^{-7}\sqrt{M^4}-12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}$$

From:

$$V = \frac{1}{3}(0.0814845\,b + 1)^2\,M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

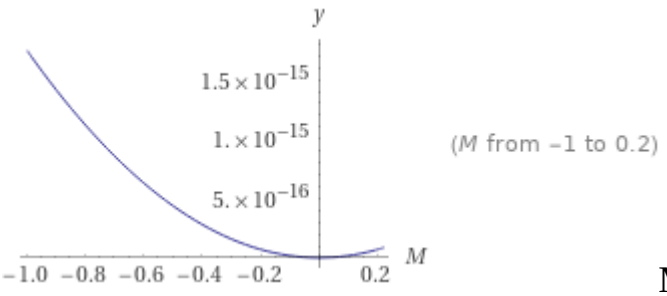
Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\,M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

Result:

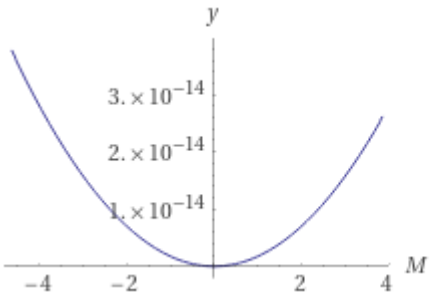
0

Plots: **(possible mathematical connection with an open string)**



M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(*M* from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O(M^{62194})$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^{\infty}\left(\frac{1}{3}M^2\left(1+\frac{18.4084\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2-1.75541\times10^{-15}\,M^2\right)dM=0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2\left(-0.5^2\right)$$

Result:

$$-4.388513449474645453489707833780880208333333333333333333\ldots\times10^{-16}$$

-4.38851344947*10^-16

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots\times10^{-17}$

7.021621519159*10^-17

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times3^2+6.58545\times10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

$1.57986484181*10^{-14}$

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 2^2 + 6.58545 \times 10^{-10}\sqrt{2^4}\right)}{2^2} + 1\right)^2 \times 2^2$$

Result:

$7.021621519159432725583532534049408333333333333333333333333\ldots \times 10^{-15}$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots\times 10^{-8}$

5.9776991059*10^-8 result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_{0}}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)])))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times 10^{-15} + 1.57986484181\times 10^{-14} + 7.021621519\times 10^{-17} - 4.38851344947\times 10^{-16}))\,\hat{}\,(1/7) - \frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_{\mathrm{P}} = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

$5.729475 * 10^{-35}$ Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_{\mathrm{P}} = \frac{F_{\mathrm{P}}}{q_{\mathrm{P}}} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

$1.820306 * 10^{61}$ V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^2 = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

$5.975498*10^{-8}$ V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

$1.042940*10^{27}$ V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P = (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P = (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

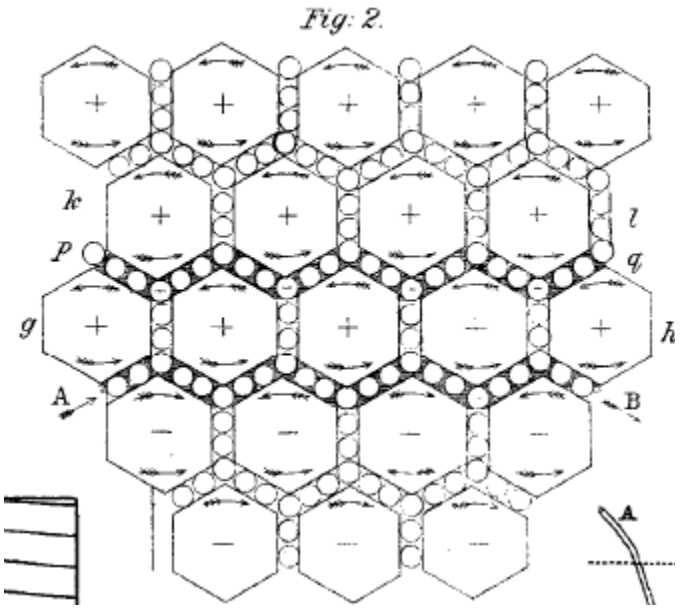
$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.042939885417075735560413475929295441554418162222542205001 33\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

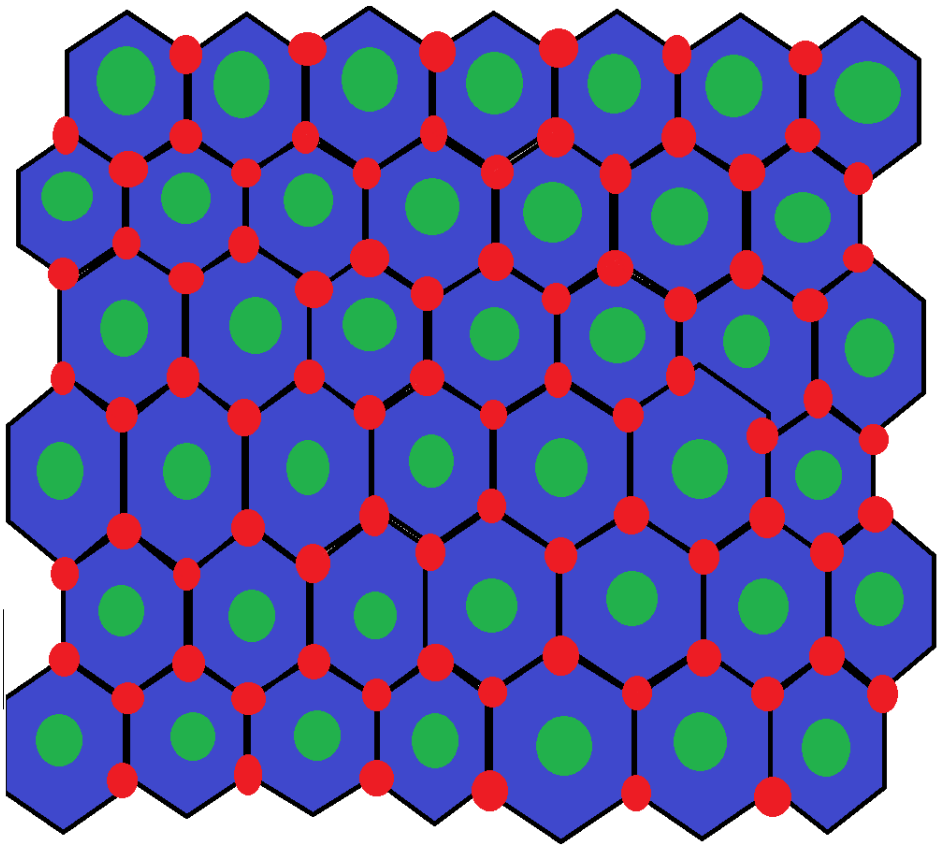
Fig. 1



It is therefore possible to consider the vortices of the "quantum vacuum" schematized as cubes or octahedrons (the + sign inside a given vortex indicates its counterclockwise rotation, while the - sign indicates its clockwise rotation). Between vortex and vortex there is a layer of "bubbles"-universes (or universes-spheres), which flows, as in the simplified two-dimensional drawing, from A to B

Fig. 2

Immagine dello Spazio-Tempo a scala quantistica: le cironferenze in rosso rappresentano i punti corrispondenti alle dimensioni compattificate e gli esagoni in blu, rappresentano le “fluttuazioni” (universi potenziali – cerchi verdi) del vuoto quantistico (2D)



Proposal

Image of space-time at quantum scale: the circles in red represent the points corresponding to the compactified dimensions and the hexagons in blue, represent the "fluctuations" (potential universes - green circles) of the quantum vacuum (2D). In reality, we will have n-dimensional hyperspheres in which the compactified dimensions "roll up" and octahedrons representing the "fluctuations", containing spheres (bubbles of potential universes), of the quantum vacuum

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We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability.

References

A Number Theoretic Analysis of the Enthalpy, Enthalpy Energy Density, Thermodynamic Volume, and the Equation of State of a Modified White Hole, and the Implications to the Quantum Vacuum Spacetime, Matter Creation and the Planck Frequency. - *Nardelli, M., Kubeka, A.S. and Amani, A.* (2024) - Journal of Modern Physics , 15, 1-50. - https://doi.org/10.4236/jmp.2024.151001

Modular equations and approximations to π - *Srinivasa Ramanujan* - Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

An Update on Brane Supersymmetry Breaking - *Jihad Mourad and Augusto Sagnotti* - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

Properties of Nilpotent Supergravity - *E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti* - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

See also:

The Geometry of the MRB constant *by Marvin Ray Burns*

https://www.academia.edu/22271085/The_Geometry_of_the_MRB_constant

(See also Page 29 the applications of the CMRB in various sectors of Theoretical Physics (String Theory) and Cosmology)

http://xoom.virgilio.it/source_filemanager/na/ar/nardelli/michele%20and%20antonio%20papers/Try%20to%20beat%20these%20MRB%20constant%20records!%20-%20Online%20Technical%20Discussion%20Groups%E2%80%94Wolfram%20Community%20b.pdf